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MOSQUITO STUDIES (Diptera, Culicidae)

XXXVI. Subgenera *Aedinus, Tinolestes* and *Anoedioporpa* of *Culex*

By

O. G. W. Berlin and John N. Belkin

CONTENTS

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XXXVI. SUBGENERA *AEDINUS, TINOLESTES* AND *ANOEDIOPORPA* OF *CULEX*[1]

By

O.G.W. Berlin and John N. Belkin[2]

INTRODUCTION

The subgenera *Aedinus* Lutz 1904, *Tinolestes* Coquillett 1906 and *Anoedioporpa* Dyar 1923 of *Culex,* revised in the present paper, were all lumped along with *Micraedes* Coquillett 1906 into the subgenus *Aedinus* Bourroul 1904 by Stone, Knight and Starcke (1959:281-282) on the basis of a short palpus in the males. As this feature had been shown to be of small importance (Edwards 1932:188) and had evolved independently in several unrelated phylads, it was a taxonomic puzzle until Belkin (1968b:11-12, 51) explicitly unraveled it. Belkin's recommendations were followed by Knight and Stone (1977) and are accepted here as indicated in the following list. *Aedinus* is credited to Lutz in Bourroul 1904 with the type species *A. amazonensis* Lutz 1905; it takes precedence over *Eubonnea* Dyar 1919 and includes in addition to *amazonensis* 3 other species. *Tinolestes* Coquillett 1906 is elevated to subgeneric rank with *latisquama* Coquillett 1906 as its type and the only included species. *Anoedioporpa* Dyar 1923 is considered as a distinct subgenus of *Culex* with *conservator* Dyar & Knab 1906 as its type (with all its current synonyms) and also includes *bamborum* Rozeboom & Komp 1948, *belemensis* Duret & Damasceno 1955, *browni* Komp 1936, *canaanensis* Lane & Whitman 1943, *corrigani* Dyar & Knab 1907, *originator* Gordon & Evans 1922, *luteopleurus* Theobald 1903 and 3 recently described species: *chaguanco* Casal, Garcia & Fernandez 1968, *damascenoi* Duret 1969 and *quasioriginator* Duret 1972. *Culex restrictor* Dyar & Knab 1906, considered to be a member of *Microculex* by Stone, Knight and Starcke (1959:28) and by Knight and Stone (1977:269), has been included in the subgenus *Anoedioporpa* in a separate group on the basis of correlated features of adults and immature stages. *Micraedes* Coquillett 1906 is a distinct subgenus as recognized by Berlin (1970). *Culex cauchensis* Floch & Abonnenc 1945 and *C. mojuensis* Duret & Damasceno 1955 have been transferred to the subgenus *Melanoconion,* which contains primarily species with a long palpus in the males.

As stated above, the species with a short palpus in the males are not all closely related and therefore cannot be assembled into a single genus or even subgenus. According to Edwards (1932:188) a study of the male genitalia and other characters

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show not only that the Oriental and Neotropical forms belong to different sections of the genus, but that even among the Neotropical forms with a short palpus in the males, there are several groups distinct in origin. In the Neotropics, this character state has developed independently in several groups of *Culex* such as *Micraedes* (Bisulcatus Group), *Aedinus, Tinolestes, Anoedioporpa* (Conservator Group), *Belkinomyia* and a few species of *Melanoconion* and probably other subgenera. *Micraedes* has been studied recently by Berlin (1970) and *Belkinomyia* by Adames and Galindo (1973). The present paper is an attempt to study in some detail the 3 principal other groups of species of *Culex* with a short palpus in the males: *Aedinus, Tinolestes* and *Anoedioporpa.*

We are indebted to the following individuals: Alan Stone, formerly associated with U. S. National Museum of Natural History (USNM), for the loan of types and other material; Thomas H. G. Aitken, Yale Arbovirus Research Unit, New Haven, CT, for valuable information on *amazonensis* and *accelerans*; J. Clastrier, Museum d'Histoire Naturelle, Paris, France for the loan of the type of *guyanensis*; Peter F. Mattingly of the British Museum of Natural History for studying the type of *luteopleurus*; William A. Powder for valuable assistance in the preparation of material; Nobuko Kitamura, L. Margaret Kowalczyk and Nancy Martsh for the preparation of preliminary and final drawings; and Sandra J. Heinemann for valuable general assistance and for the preparation of the text copy for lithoprinting.

MATERIAL AND METHODS

This study is based largely on extensive collections of adults and associated immature stages accumulated at the University of California, Los Angeles for the project "Mosquitoes of Middle America" (Belkin, Schick et al. 1965) and also on material from U. S. National Museum of Natural History (USNM) where most of the types are deposited. For this revision 4802 specimens were studied, including 739 males, 702 females, 1011 pupae, 2350 larvae, with 777 individual rearings (198 larval, 482 pupal and 97 incomplete).

The method of presentation, terminology and abbreviations used in the descriptions of taxa in general follow Belkin (1962). No attempt was made to locate hairs (?) 16,17,18,19-C on the head capsule and cervical area of the fourth instar larvae, although these have been noted by others in some groups (Belkin 1962:87,94,236, 249, figs. 36,140,156 etc.; 1968a:12, fig. 6; Hochman and Reinert 1974). The exact nature of some of these at least has not been determined as yet.

For every species, all the available stages are illustrated. Each illustration in based on topotypic specimens whenever available but the modal value of each character, such as hair branching, is based on 5 to 10 specimens when available. In the illustrations of adults, only pertinent details, such as male genitalia, are given. The type species of all the 3 subgenera and Groups are illustrated in detail.

In the distribution lists, the arrangements of the countries, their major subdivisions and the individual localities are listed alphabetically. All material we have examined as well as published records that we consider reliable are given under distribution. Political subdivisions and locality names in the distribution lists conform to the recommended usage in the Official Standard Names Gazetteers of the United States Board on Geographic Names.

The abbreviations used for type depositories as well as depositories of material listed in this paper are as given in "A catalog of the mosquitoes of the World" 1977

except for UCLA (Dept. of Biology, University of California, Los Angeles, CA 9002-4). All the latter material will eventually be deposited in USNM.

KEYS TO SUBGENERA OF *CULEX* IN THE AMERICAS

ADULTS

1. Acrostichal bristles developed on disc of mesonotum 2
   Acrostichal bristles not developed except at extreme anterior end of mesonotum and/or near prescutellar space 8

2(1). Usually 6 or more lower *mep* bristles; all femora speckled; vein *C* with alternate brown and yellow scaled areas . . . . . ***Lutzia***
   Usually 1 or 2 lower *mep* bristles, rarely 3 or more; femora not conspicuously speckled; vein *C* without alternate brown and yellow scaled areas 3

3(2). Abdomen usually with at least indication of apicolateral or apical pale tergal markings on some segments . . . . . ***Neoculex***
   Abdomen without apicolateral or apical transverse pale tergal markings; if pale markings present, basal or basolateral 4

4(3). Pleuron with distinct scale patches on *stp* . . . . . ***Culex***
   Pleuron at most with a few scales along *stp* bristles 5

5(4). Tarsi with basal light scales . . . . . in part ***Microculex***
   Tarsi completely dark 6

6(5). Palpus about 0.35 of proboscis in both sexes, very slender; lower *mep* without bristles (Bisulcatus Group) . . . . . in part ***Micraedes***
   Palpus less than 0.25 of proboscis in females and subequal to proboscis in males 7

7(6). Pleural integument uniformly pale to yellowish (Restrictor Group) . . . . . in part ***Anoedioporpa***
   Pleural integument mostly pale to yellowish but brown on *ppn,* lower *stp* and lower *mep* (Schicki and Erethyzonfer Groups) . in part ***Micraedes***

8(1). Abdomen with iridescent basolateral tergal markings . . . . . ***Carrollia***
   Abdomen completely dark or with noniridescent pale tergal markings . 9

9(8). Vertex of head with at least a line of broad decumbent scales along orbital margin, usually all decumbent scales on vertex broad . . ***Melanoconion***
   Vertex scales on head narrow, even along orbital lines 10

10(9). Propleural bristles (*ppl*) very strongly developed, at least 20 (20-25); middle *mep* with a patch of scales and short bristles . . . . . ***Tinolestes***
   Propleural bristles (*ppl*) poorly developed, fewer than 10, usually about 5; middle *mep* without patch of scales or short bristles 11

11(10). Veins R_2 and R_3 with broad scales only 12
   Veins R_2 and R_3 with narrow scales 13

12(11). Decumbent scales on vertex and sides of head whitish; *stp* with a narrow patch of translucent scales along bristles . . . . . ***Aedinus***
   Decumbent scales on vertex and sides of head dark; *stp* at most with a few scales along bristles . . . . . ***Belkinomyia***

13(11). Upper *stp* with distinct patch of scales . . . . . in part ***Microculex***
Upper *stp* without patch of scales (Conservator Group) . . . . . .
. . . . . in part ***Anoedioporpa***

MALE GENITALIA

1. Paraproct with a dense clump of sharp spicules in addition to blunt teeth
. . . . . ***Culex***
Paraproct with only a single row of blunt teeth 2

2(1). Lobe on sidepiece poorly developed . . . . . ***Lutzia***
Lobe on sidepiece strongly developed 3

3(2). Phallosome columnar, blunt and without a basal hook on each side . .
. . . . . ***Neoculex***
Phallosome not columnar and with a basal hook on lateral plate on each side 4

4(3). Clasper short, stout, about 0.3 length of sidepiece; basal hook of lateral plate with distinct denticles along its length . . . . . ***Belkinomyia***
Clasper moderately long, at least 0.5 length of sidepiece; basal hook of lateral plate usually without denticles 5

5(4). Paraproct with 22-24 apical teeth; clasper with an external hyaline crest at about middle; IX tergite lobe flat, bearing erect bristles on tubercles
. . . . . ***Tinolestes***
Paraproct with fewer than 14 apical teeth; clasper without an external crest; IX tergite lobe variable in shape, bearing weaker setae 6

6(5). Lobe of sidepiece submedian in position, undivided, stem bearing usually 1 appendage . . . . . ***Aedinus***
Lobe of sidepiece subapical in position, at least faintly divided, stem of proximal division bearing 2 appendages 7

7(6). Distal division of subapical lobe poorly developed, or faintly separated from proximal division 8
Distal division of subapical lobe distinctly separated and subequal in length to proximal division 10

8(7). Apex of clasper usually enlarged, variously shaped and/or proximal division with an accessory lobe; distal division when present usually with 1 lanceolate seta . . . . . ***Carrollia***
Apex of clasper without enlargement; proximal division of lobe without an accessory lobe; distal division usually bearing more than 1 seta . . 9

9(8). Lobes of tergite IX distinct, well separated; interlobar space wide, its width greater than basal width of one lobe . . . . . ***Microculex***
Lobes of tergite IX distinct, closer; interlobar space narrow, its width less than basal width of one lobe . . . . . ***Micraedes***

10(7). Lobes of tergite IX enlarged, variously shaped; interlobar space narrow .
. . . . . ***Melanoconion***
Lobes of tergite IX smaller, usually moundlike; interlobar space wide . .
. . . . . ***Anoedioporpa***

PUPAE

1. Abdominal tergite VIII with caudal lobe overlying lateral part of tergite IX 2
   Abdominal tergite VIII with caudal lobe not overlying lateral part of tergite IX 4

2(1). Paddle margins with long hairlike spicules (Schicki and Erethyzonfer Groups) . . . . . in part ***Micraedes***
   Paddle margins smooth 3

3(2). Hair 5-C extremely long, at least 3.0 of 4-C; hair 1-IX absent (Bisulcatus Group) . . . . . in part ***Micraedes***
   Hair 5-C shorter, subequal in length to 4-C; hair 1-IX present but small . . . . . ***Anoedioporpa***

4(1). Meatus of trumpet with narrow slit from proximal part of pinna . . . . . ***Melanoconion***
   Meatus of trumpet without slit from proximal part of pinna 5

5(4). Paddle hairs (1,2-P) both absent; paddle with a distinct pigmented spot distally along midrib . . . . . ***Aedinus***
   At least 1 paddle hair present; paddle without a distal pigmented spot . 6

6(5). Hair 9-VIII well removed cephalad from caudolateral angle and always within 0.7 from base . . . . . ***Lutzia***
   Hair 9-VIII at or immediately adjacent to caudolateral angle 7

7(6). Hair 2-III laterad of 1-III; hair 9-VII short, distinctly smaller than 3-VII . . . . . ***Belkinomyia***
   Hair 2-III mesad of 1-III; hair 9-VII longer, distinctly larger than 3-VII . 8

8(7). Hair 2-VI laterad of 1-VI 9
   Hair 2-VI mesad of 1-VI 10

9(8). Hair 11-C double; 9-VIII double, shorter than length of tergite VIII . . . . . ***Tinolestes***
   Hair 11-C single; 9-VIII with more than 3 branches, at least subequal to length of tergite VIII . . . . . ***Microculex***

10(8). Only 1 paddle hair (1-P) present; hair 2-VII mesad of 1-VII . . ***Carrollia***
   Both paddle hairs (1,2-P) distinct; 2-VII cephalad or laterad in position 11

11(10). Metanotal hair 10-C usually multiple, rarely with 3,4 branches . . ***Culex***
   Metanotal hair 10-C usually with fewer than 4 branches . . . ***Neoculex***

FOURTH INSTAR LARVAE

1. Labrum produced in front; mouthbrushes thickened, inserted in compact groups laterally . . . . . ***Lutzia***
   Labrum not produced in front; mouthbrushes normal 2

2(1). Hair 2-C strongly developed, always mesad of 1-C; comb scales usually in a single row, if in a small patch, then siphon with long subventral tufts within pecten . . . . . ***Carrollia***
   Hair 2-C weakly developed, indistinct or absent, when present laterad of 1-C; subventral tufts usually not within pecten 3

3(2). Ventral brush (4-X) with 4 pairs of hairs . . . . . ***Microculex***
Ventral brush (4-X) with 5 or more pairs of hairs 4

4(3). Caudolateral border of anal saddle with long slender spines . . ***Micraedes***
Caudolateral border of anal saddle without spines or with only small inconspicuous spicules 5

5(4). Prothoracic hair 3-P of the same order of magnitude and thickness as hair 1-P, usually at least 0.67 as long . . . . . ***Culex***
Prothoracic hair 3-P much thinner and shorter than hair 1-P, usually less than 0.5 of its length 6

6(5). Ventral brush with 1 or more hairs proximad of grid; siphon without any subdorsal tufts distinctly above subventral tufts . . . . . ***Neoculex***
Ventral brush without any detached hairs proximad of grid; siphon with 1 or more pairs of subdorsal tufts distinctly above subventral tufts . . 7

7(6). Siphonal hair 2-S very strongly developed, recurved and usually with a recurved tooth on shaft; subdorsal tufts on siphon conspicuous . . . . . ***Melanoconion***
Siphonal hair 2-S inconspicuous, poorly developed but of the same type; subdorsal tufts on siphon less conspicuous 8

8(7). Saddle hair 2-X long, single . . . . . ***Anoedioporpa***
Saddle hair 2-X with at least 1 additional subbasal branch 9

9(8). Saddle with an attached acus ventrad; hairs 1,2-VIII on sclerotized plates; ocular bulge prominent . . . . . ***Aedinus***
Saddle without any indication of an acus; hairs 1,2-VIII on simple alveoli; ocular bulge not prominent 10

10(9). Head capsule with imbrications visible at 200X; hair 2-X with 3 additional short to moderately long subbasal branches . . . . . ***Tinolestes***
Head capsule smooth at 200X; hair 2-X with only 1 additional short subbasal branch . . . . . ***Belkinomyia***

SUBGENUS *AEDINUS* Lutz 1904

INTRODUCTION

Aedinus was proposed as a distinct genus in 1904 but its authorship was a very involved problem until Belkin (1968b:48-51) solved it. According to Belkin, Lutz was the author of all the nominal taxa in Bourroul's thesis except *mariae,* and therefore he attributed the generic taxon *Aedinus* to Lutz *in* Bourroul 1904 (Lutz 1904a:12; 1904b:4) and eliminated *Aedinus* Bourroul 1904 of Stone, Knight and Starcke (1959:281).

As for the type species, Stone, Knight and Starcke gave for their *Aedinus* Bourroul 1904 the haplotype *Aedeomyia americana* Neveu-Lemaire which was the only species referred to *Aedinus* in the paper where this genus was described (Lutz 1904b:4). But in "Catalogo" (Lutz 1904a:12) in Bourroul's thesis, *americana* was questionably referred to *Aedinus* and only *A. amazonensis* Lutz (n. e.) was included in *Aedinus* Lutz (n. gen.). According to Belkin (1968b:51): "If the designation of *americana,* which is a *nomen dubium,* as type species is accepted, *Aedinus* also becomes a *nomen dubium.* In my opinion, a better solution is to consider *Aedinus* without included spe-

cies in 1904 since both *amazonensis* and *nigricorpus* were *nomina nuda* in 1904 (neither can be regarded as described by indication by a new generic description since 2 names are involved) and *americana* is referred to it questionably, and to designate *Aedinus amazonensis* Lutz, 1905 as the type species as it was the only included species in the first subsequent publication of the genus. This restores *Aedinus* Lutz, 1904 as a valid subgenus in *Culex* in the sense of Lutz, 1904 and 1905, and as it has been used before Stone, Knight and Starcke (1959), replacing its subjective junior synonym *Eubonnea* Dyar, 1919."

In the present study, *Aedinus* Lutz 1904 is treated as a distinct subgenus of *Culex* with *amazonensis* Lutz 1905 as its type species. In addition, *accelerans* Root 1927 and 2 recently described species, *clastrieri* Casal and Garcia 1968 and *guyanensis* Clastrier 1970, are included in this subgenus.

TAXONOMIC TREATMENT

Figs. 1-7

1904. *Aedinus* Lutz 1904a:12. TYPE SPECIES: *Aedinus amazonensis* Lutz 1905:103-104, Manaus, Amazonas, Brazil. Determination by Belkin 1968b:51.

1919. *Eubonnea* Dyar 1919:150. *TYPE SPECIES: *Culex (Eubonnea) tapena* Dyar 1919:150, Paramaribo, Suriname; only included species. Synonymy with *Aedinus* by Belkin (1968b: 11).

Culex (Aedinus) of Dyar (1923b:187,190); Bonne and Bonne-Wepster (1925:279); Edwards (1932: 220); Anduze (1941b:17); Lane (1949:255; 1953:385); Foote (1954:4); Horsfall (1955:547); Galindo and Blanton (1955:68,69-70); Fauran (1961:43); Belkin (1968b:11,51); Stone (1970: 164); Knight and Stone (1977:194-195, in part).

Culex (Eubonnea) of Stone, Knight and Starcke (1959:280); Stone (1961:47); Belkin (1962:179); Stone (1963:135); Forattini (1965:31,32,34,35,187,192); Cova Garcia, Sutil and Rausseo (1966a:27; 1966b:352); Aitken, Spence et al. (1969:213).

Aedinus of Lutz (1904b:4; 1905:103-104); Blanchard (1905:620,633); Peryassu (1908:36,51, 253); Theobald (1910:487); Surcouf and Gonzalez-Rincones (1911:219,223).

FEMALES (fig. 2). Usually small inornate species, dark brown to blackish and with unbanded legs. **Head**: Eyes not distinctly separated above antennae. Decumbent scales narrow and linear dorsally, predominantly white; broader on sides and venter. Erect scales on occiput moderately long, forked apically, extending to sides of vertex. Orbital and interorbital bristles strong; upper orbitals 5 (5,6) pairs, heavier, longer and more widely spaced than lower. Clypeus bare, dark brown. Proboscis distinctly longer than forefemur, entirely dark scaled, with a few basal bristles. Palpus short, about 0.2 of proboscis length; 4-segmented; segments 1 and 2 ankylosed, without scales; segment 4 about 2.0 of segment 3, both dark scaled. Antenna slightly longer than proboscis; torus brown, with a few short, dark brown setae mesally; flagellar segments 2-13 with 6 moderately long bristles in basal whorls. **Thorax**: Integument dark brown. Mesonotum with narrow, curved, auburn to dark scales except along a pair of narrow inner dorsocentral "bare lines" extending from anterior margin to 0.75 of its length. Acrostichal bristles absent. Bristles on anterior promontory distinct; dorsocentrals, prescutellars and supraalars always present, variously developed; 2,3 posterior fossal and 1 parascutellar always developed. Antealar area above paratergite with scattered dark scales. Median scutellar lobe with 6 long and 6 short marginal bristles and a large patch of dark narrow scales; lateral lobe with about 4 long and 3 short marginal bristles and a small patch of dark narrow scales. Paratergite bare. Pleuron dark brown to blackish. Bristles present on *apn, ppn, ppl, stp, pra*

and upper *mep*; propleural area with about 10-12 short bristles; lower *mep* with single, strong bristle; metameron bare. Pleural scaling restricted to *ppn* and *stp*; upper *ppn* with a few dark scales; *stp* with 2,3 rows of flat, translucent, moderately broad scales along bristles. **Legs**: Dark scaled. Claws simple on all legs. **Wing**: Veins entirely dark scaled; all scales squamous. **Haltere**: Stem brown, knob entirely scaled. **Abdomen**: Laterotergite with many moderately long bristles and a few scattered scales. Tergites II-VII predominantly with dark brown scales. Sternites with dull white or dark scales.

FEMALE GENITALIA (fig. 2). Only *amazonensis,* the type species, studied. **Segment VIII** partially retracted into segment VII, apex visible, numerous bristles and scales present; tergite VIII about 0.5 of sternite, both with shallow emargination apically. **Tergite IX** well developed, lobes distinct, bearing about 9 short setae; **sternite IX** narrow laterally, membranous in the middle. **Postgenital plate** about 0.7-0.8 length of cercus, slightly emarginate apically; each side with 2 apical and 9,10 scattered setae. **Cowl** moderately developed, irregularly shaped, bowed laterally to join tergite IX. **Sigma** membranous, finely spiculose, continued medially as a membranous **insula** with a group of 9,10 setae. **Cerci** moderately long, compressed, approximate, each with many short to moderately long setae; area between cerci slightly bilobed. **Spermathecae** 3, one a little larger than others.

MALES (fig. 2). Coloration similar to females; sexual dimorphism of head appendages marked. Proboscis longer than forefemur. Palpus porrect, about 0.2 of proboscis length; apparently 4-segmented; segments 1 and 2 ankylosed, without scales; segment 4 subequal in length to 3, partly ankylosed, dark scaled. Antenna subequal in length to proboscis; whorls of flagellar segments 1-12 strongly developed, with at least 24 long bristles; segments 12 and 13 elongate, 13 slightly longer than 12; torus not swollen. Claws of foreleg and midleg enlarged, unequal; larger claw on foreleg with a submedian tooth, that of midleg without tooth, both claws with basal spicules. Hind claws as in females.

MALE GENITALIA (figs. 3,5,6). **Segment IX**: Lobes of tergite IX moderately long, distinctly separated, digitiform, bearing a few very short, weak, apical setae. **Sidepiece**: Roughly oval; length about 2.0 greatest width; with longer bristles on tergal and lateral sides, sternal surface with shorter setae; scales on lateral and/or sternal surfaces. **Lobe** submedian in position, bearing 1 or 2 appendages. **Clasper**: Comparatively simple or enlarged subapically; spiniform subapical. **Phallosome**: Lateral plate of aedeagus with a broadly sclerotized "basal hook," a caudally directed blunt apical process and 2 short sternal processes. **Proctiger**: Basolateral sclerotization moderately developed, produced into a conical lobe below tergite IX; apex of paraproct with a crown of 5-9 teeth; cercal setae indistinct.

PUPAE (figs. 3,6). **Cephalothorax**: Middorsal ridge moderate. Integument with a characteristic pattern of pigmentation. All hairs present, variously developed. Hair 5-C moderately long, weakly developed, subequal in length to 4-C; hair 6-C smaller than and cephalad of 7-C; hairs 8,9-C widely separated, double or triple, 8-C slightly and 9-C distinctly caudad of trumpet base. **Trumpet**: Not placed on tubercle; moderately long, index 7.0-8.5; pigmentation strong; tracheoid distinct, moderately long; apex distinctly flared; pinna moderately long. **Metanotum**: Hair 10-C shorter than 11-C, multiple, weakly branched. **Abdomen**: Integument with a distinct pattern of pigmentation. Hair 3-I single; 1-II with at least 15 weak branches, faintly resembling float hair (1-I); hair 2-III distinctly mesad of 1-III, submarginal; hair 5-IV-VI moderately long, branched, terminating before the apex of succeeding segment; 6-II-VI double; 2-VI,VII always laterad of hair 1; hair 9-VII,VIII single, short, distinctly shorter

than corresponding tergite length; 4-VIII at least double; 1-IX small, single. Lobes on posterior margin of sternum mesad of 9-VIII indistinct. Tergite VIII never overlapping base of tergite IX. **Paddle**: Lightly pigmented except for a distal pigmented patch along midrib; longer than wide, apex smoothly rounded; midrib strongly differentiated; paddle margin without spicules; both paddle hairs (1,2-P) absent.

FOURTH INSTAR LARVAE (figs. 4,7). **Head**: Head capsule faintly imbricate, without lateral expansion on each side caudad of antenna. Labrum well differentiated dorsally. Ocular lobes distinct. Mouthbrushes with numerous filaments. Collar moderately develped, narrow. Posterior tentorial pit a short distance from caudal border. Maxillary suture complete, extending a short distance caudolaterad of pit. Anterior border of labial plate truncate. Aulaeum with distinct filamentous spicules. Central tooth of mental plate not shouldered. Hair 0-C small, removed laterad of 1-C; hair 1-C strong, straight; 2,3-C not developed; 4-6-C closely grouped together and caudad of level of 7-C; hair 5-C single or double, 6-C single, both shorter than antenna; 7-C multiple, with strong, barbed branches; 8-C at least triple (3-5); hair 11-C with 3-7 weak branches; 13-C closer to 11-C than to 12-C; hairs 14,15-C not moved anteriad; basal maxillary hair (*bmh*) small, single; 16,17-C not developed. **Antenna**: Hair 1-A long, multiple, about 0.60-0.65 from base; other hairs short to moderately long, single. **Thorax**: Roughly oval in outline, wider than long. Integument glabrous. Hairs 1-3-P on a distinct tubercle; 3-P moderately long, single or double; 14-P single or double; 0-P, 1,13,14-M, 1,3,13-T with many weak branches, not stellate. **Abdomen**: Integument glabrous; segments darkly pigmented except IV. Hair 2 never moved far cephalad of 1, always within posterior half of segment. **Segment VIII**: Comb in a patch of 3,4 irregular rows. Hair 1-VIII on a small tubercle and 2-VIII on an elongated sclerotized plate. **Siphon**: Integument glabrous. Acus long, attached. Pecten with denticles on ventral border; 5,6 pairs of subventral (1,1a-S) and 2 pairs of subdorsal (2a-S) hairs; proximal subdorsal hair distinctly basad of proximal subventral hair; 2-S distinct, slightly curved with a subbasal branch. **Anal Segment**: Saddle complete; integument of saddle glabrous; acus present, small, attached; caudal margin without spines; lateral hair (1-X) short to very short, multiple, submarginal. Hair 2-X long, with 2 subbasal branches; 3-X long, single; ventral brush (4-X) with 6 pairs of branched hairs on grid. Gills sausage-shaped, ventral slightly longer than dorsal.

GENERAL CONSIDERATIONS

SYSTEMATICS. **Adults** of *Aedinus* can be separated from those of other American subgenera of *Culex* by the combination of the following characters: (1) short palpus in both sexes, (2) presence of moderately broad scales on R_2 and R_3 as on other veins, and (3) absence of acrostichal bristles. In the **male genitalia**, *Aedinus* can be distinguished from other subgenera by the combination of: (1) shape of the IX tergite lobe which is digitiform and bears short weak setae, (2) nature and position of subapical lobe of sidepiece, (3) shape of clasper, and (4) details of phallosome complex. In the **pupal stage** it differs from others by the combination of: (1) distinct pattern of pigmentation on cephalothorax and abdomen, (2) moderately long trumpet with an apical flare, (3) nature and branching of hair 9-VII,VIII, and (4) pigmented spot on the paddle. In the **larval stage**, *Aedinus* can be distinguished from other subgenera by the combination of: (1) width of head greater than length, (2) faint imbrications on head capsule, (3) distinct ocular bulge, (4) 6 pairs of hairs in ventral brush, (5) hair 2-X with 1 or 2 additional subbasal branches, (6) hairs 1,2-VIII on distinct sclerotized plates, and (7) attached acus on anal saddle. The last character dis-

tinctly separates *Aedinus* from all other subgenera of *Culex*.

All recognized species of *Aedinus* are difficult or nearly impossible to differentiate as preserved adults. The description and recognition of all species have been primarily based on male genitalia which provide excellent diagnostic features. The immature stages of *clastrieri* and *guyanensis* are unknown, but when found, will probably be more similar to *amazonensis* than to *accelerans*. In the immature stages, *amazonensis* displays clearcut differences from *accelerans*; therefore, characters in the larval and pupal stages may also help in differentiating the various species within the subgenus.

BIONOMICS AND MEDICAL IMPORTANCE. Species of *Aedinus* breed primarily in swamp margins and root caves in swamp interiors in virgin forests and occasionally in ground pools in partially forested areas. Though blooded females have been collected, it is not known whether females are attracted to man. Arboviral studies on *amazonensis* and *accelerans* show that they harbor a spectrum of viruses (Aitken, Spence et al. 1969:212-213). While females of *accelerans* inoculated into mice yielded 3 viruses (VEE, Caraparu and Nepuyo), those of *amazonensis* have been found to be infected with 7 different arboviruses (VEE, Caraparu, Catu, Guama, Wyeomyia, Bushbush and Aruac). It appears, therefore, that they are involved in the transmission of these viruses in the different animals in the forests. Additional information can be found in the bionomics sections of the individual species accounts.

DISTRIBUTION (fig. 1). The subgenus *Aedinus* is distributed primarily in northern South America and penetrates into Panama. Apparently all species are restricted to swampy coastal areas and penetrate deep into the mainland only along the mouth of the Amazon River. Of the 4 described species of the subgenus, *amazonensis* and *accelerans* appear to have a wider distribution in terms of range and number of individuals. On the other hand, *clastrieri* and *guyanensis* have a restricted distribution.

The subgenus is confined to the mainland of the neotropics. The northern limit appears to be Panama, and no species of *Aedinus* has been reported north of this area; the southern limit is Porto das Caixas, Rio de Janeiro, Brazil, the type locality of *accelerans*.

AFFINITIES. *Aedinus* is a distinct subgenus of *Culex* and several subgenera have been erroneously synonymized with it (Stone, Knight and Starcke 1959:281). Though adults of *Aedinus* show resemblance to those of *Tinolestes* and *Belkinomyia,* the subgenus is distinct in the male genitalia, immature stages and biology (breeding sites). The following combination of characters in the male genitalia and immature stages of *Aedinus* may be diagnostic for the subgenus; in the **male genitalia** by: (1) position and details of the lobe of sidepiece, (2) details of clasper and phallosome complex, and (3) shape of IX tergite lobes; in the **pupae** by: (1) characteristic integumental pigmentation, (2) nature and branching of hair 9-VII,VIII, (3) pigmented spot in the paddle, and (4) absence of both paddle hairs (1,2-P); in the **larvae** by: (1) faint imbrications on head capsule, (2) hairs 1,2-VIII on distinct sclerotized plates, (3) distinct attached acus on saddle, and (4) 6 pairs of hairs on ventral brush (4-X). In spite of some slight overlap with *Tinolestes* and *Belkinomyia, Aedinus* is a distinct group and should be retained as a subgenus of *Culex*.

KEYS TO SPECIES OF *AEDINUS*

ADULTS

1. Abdominal sternites white scaled . . . . . ***1. amazonensis***
   Abdominal sternites dark scaled 2

2(1). Pleuron pale brown . . . . . ***2. clastrieri***
   . . . . . ***3. guyanensis***
   Pleuron dark, with a smoky bluish gray iridescence . . . . . ***4. accelerans***

MALE GENITALIA

1. Clasper simple, not enlarged subapically; appendage on subapical lobe of sidepiece distinctly longer than stem . . . . . ***4. accelerans***
   Clasper distinctly enlarged subapically; appendage on subapical lobe of sidepiece shorter than stem 2

2(1). Expanded portion of clasper sharply attenuating distally; dorsal surface of sidepiece laterad of subapical lobe with a few bristles . . ***1. amazonensis***
   Expanded portion of clasper gradually tapering distally; dorsal surface of sidepiece laterad of subapical lobe with a dense patch of bristles . . . 3

3(2). Stem of subapical lobe of sidepiece with 2 setae, subapical and subbasal; appendage on subapical lobe moderately long, pointed, about 0.7 of stem
   . . . . . ***2. clastrieri***
   Stem of subapical lobe of sidepiece with only 1 small subapical seta; appendage on subapical lobe short, blunt apically, less than 0.5 of stem . . .
   . . . . . ***3. guyanensis***

PUPAE

(*2. **clastrieri*** and *3. **guyanensis*** unknown)

1. Pinna moderately long, about 0.35 length of trumpet; tergite VIII uniformly lightly pigmented; metanotal pigmentation uniformly light . . . . . .
   . . . . . ***1. amazonensis***
   Pinna shorter, less than 0.25 length of trumpet; tergite VIII with distinct median and lateral pigmented areas extending entire length of tergite; metanotum pigmented at middle . . . . . ***2. accelerans***

LARVAE

(*2. **clastrieri*** and *3. **guyanensis*** unknown)

1. Hair 5-C double; 2-X usually with only 1 additional, short subbasal branch; siphon with 5 pairs of subventral hairs . . . . . ***1. amazonensis***
   Hair 5-C single; 2-X with 2 additional subbasal branches; siphon with 6 pairs of subventral hairs . . . . . ***2. accelerans***

1. Culex (Aedinus) amazonensis (Lutz)

Figs. 1,2,3

1905. *Aedinus amazonensis* Lutz 1905:103-104. TYPE: *Syntypes* male, female, Manaus, Amazonas, Brazil, date and collector not specified [LU].

1919. *Culex (Eubonnea) tapena* Dyar 1919:150. *TYPE: *Holotype* male, Paramaribo, Suriname, 5 Jan 1919, J. Bonne-Wepster [USNM, 11623]. Synonymy with *amazonensis* by Dyar (1923b:189).

1922. *Culex (Carrollia) paraplesia* Dyar 1922b:192-193. *TYPE: *Holotype* male, Puerto Nino, Colombia, 21 Feb 1922, F.A. Miller [USNM, 25762]. Synonymy with *amazonensis* by Dyar (1923b:189).

1923. *Culex hildebrandi* Evans 1923b:377-380. *TYPE: *Holotype* male, Manaus, Amazonas, Brazil, 1922, A.A. Clark [BM]. Synonymy with *amazonensis* by Dyar (1923b:189).

Culex (Aedinus) amazonensis of Howard, Dyar and Knab (1915:217); Dyar (1923b:190; 1924:183); Bonne and Bonne-Wepster (1925:184,279-281); Edwards (1932:220); Lane (1939:81; 1953:378,385-386); Anduze (1941b:17; 1947:358); Floch and Fauran (1954:2-3); Galindo and Blanton (1955:70); Castro, Garcia and Bressanello (1959:552); Cerqueira (1961:31); Fauran (1961b:43); Belkin (1968b:11,15,51); Belkin, Schick and Heinemann (1971:27); Knight and Stone (1977:195); Heinemann and Belkin (1978a:183; 1978b:393,407, 437,456; 1978c:523; 1979:80,94,107).

Culex (Eubonnea) amazonensis of Stone, Knight and Starcke (1959:280-281); Stone (1961:47; 1963:135); Forattini (1965:26,35,187); Cova Garcia, Sutil and Rausseo (1966a:27; 1966b:101, 352); Aitken, Spence et al. (1969:210,212-213); Xavier and Mattos (1975:245, as *Eubonnea*).

Culex amazonensis of Fauran (1961a:8-11).

Aedinus amazonensis of Blanchard (1905:633); Peryassu (1908:51,253-254); Theobald (1910:487); Surcouf and Gonzalez-Rincones (1911:223-224).

Culex (Eubonnea) tapena of Bonne-Wepster and Bonne (1923:126); Stone and Knight (1957:59).

FEMALE (fig. 2). Wing: 2.25 mm. Proboscis: 1.4 mm. Forefemur: 1.1 mm. Abdomen: 1.6-1.7 mm. As described for the subgenus with the following additional features. **Head**: Decumbent scales on vertex narrow, white, broader on sides and venter. Erect scales dark brown. Palpus short, dark scaled. **Thorax**: Pleuron light brown to gray. Propleural areas with 9-12 short bristles. **Legs**: Coxae with brown scales on external surface; trochanters with ventral brown scales. Forefemur and midfemur with auburn scales anteriorly, scales on posterior side creamy basally, rest auburn; scales on hindfemur mostly creamy ventrally, auburn dorsally. Tibiae and tarsi of all legs with auburn scales. **Wing**: Scales on all veins dark, squamous and moderately broad. **Haltere**: Stem pale brown, knob with auburn scales. **Abdomen**: Tergites auburn, scales on lateral areas paler; sternites with whitish to creamy scales.

MALE (fig. 2). Wing: 2.4 mm. Proboscis: 1.7 mm. Forefemur: 1.25-1.30 mm. Similar to female in general features. Palpus short, about 0.2 length of proboscis.

MALE GENITALIA (fig. 3). Diagnostic characters as in the key. **Segment IX**: Tergite lobes moundlike, distinctly separated, each bearing a subbasal digitiform appendage with 6-10 short weak apical setae. **Sidepiece**: Ovate, length about 2.0 of greatest width; lateral surface with longer bristles and sternal side with shorter setae; scales present on basolateral and sternal surfaces; 4-6 broad saberlike setae and about 5,6 rounded bristles distad and 5,6 rounded setae laterad of lobe. **Lobe**: Submedian in position, stem distinct, undivided; apex bearing a short pointed appendage; a short subbasal seta on stem. **Clasper**: Long, about 0.7 length of sidepiece, expanded subapically, sharply attenuating distally; spiniform short, simple. **Lateral Plate**: Basal hook broadly sclerotized and strongly curved; apical process broadly rounded and denticulate; sternal part split into 2 short processes. **Proctiger**: Cercal sclerite

short, triangular; cercal setae absent. Paraproct with 8,9 blunt apical teeth.

PUPA (fig. 3). Abdomen: 2.4-2.5 mm. Trumpet: 0.55-0.60 mm; index 8.0-8.5. Paddle: 0.65-0.70 mm. As described for the subgenus with the following additional features. Diagnostic characters as in the key. **Cephalothorax**: Integument with the characteristic pattern of pigmentation; middorsal ridge area, lateral and posterior parts of wing case, and middle portions of leg cases moderately pigmented, rest lighter. Hair 4-C usually double; 5-C usually 4-branched (2-6) and subequal in length to 4-C; hair 7-C usually triple (2-4); hairs 8,9-C double. **Trumpet**: Moderately pigmented, apex distinctly flared; pinna moderately long, about 0.30-0.35 length of trumpet; tracheoid distinct, strongly pigmented. **Metanotum**: Uniformly moderately pigmented. Hair 10-C multiple (5-9), weakly branched; 11-C single; 12-C usually triple (2-4). **Abdomen**: Except for tergite V, uniformly lightly pigmented, progressively lighter caudad; tergite V moderately pigmented and distinctly contrasting with other tergites. Hair 1-II multiple (22-31), weakly branched, faintly resembling float hair (1-I); hair 1-II-VI multiple, usually with 3-5 branches; 2-III mesad and 2-IV-VII laterad of hair 1; hair 9-VII,VIII single; 4-VIII usually triple. **Paddle**: Lightly pigmented; pigmented spot apically at level of midrib; apex smoothly rounded. Male genital lobe extending to 0.4 and female genital lobe to 0.2 of paddle.

FOURTH INSTAR LARVA (fig. 4). Head: 0.6 mm. Siphon: about 1.5 mm. Anal Saddle: 0.3 mm. As described for the subgenus with the following additional features. Diagnostic characters as in the key. **Head**: Width about 1.5-1.6 of length. Mental plate well developed, with 7,8 lateral teeth. Hair 4-C usually double (2-4), anteriad of 5-C; hair 5-C double, barbed; 7-C with 5-7 strong barbed branches, extending to base of antenna; 11-C with 3-7 weak branches. **Antenna**: Integument yellowish; spiculate to base of 1-A; hair 1-A with 22-29 barbed branches. **Thorax**: Integument glabrous. Hairs unbranched or with branches of varied length, not stellate. **Abdomen**: Integument glabrous. Hairs 1,2,4,11,13-I, 1,2,5,9,13-II, 1,2,5,7-9,13-III-VI, 1,2,5,8,10,13-VII unbranched, or with branches of varied length and thickness, never stellate; 6-I,II long, double, branches subequal; 7-I long, single; 7-II short, multiple; 6-III-V moderately long, at least triple, branches subequal; 6-VI shorter, usually triple (2,3), branches subequal. **Segment VIII**: Comb scales spatulate, 30-39 in number, apex fringed. Hari 2-VIII double; 5-VIII usually 4-branched. **Siphon**: Integument yellowish, with a narrow basal dark ring; long, index about 14-15. Pecten with 17 (16-18) teeth, extending to basal 0.25; each tooth with 7,8 denticles on ventral border; only 5 pairs of subventral (1,1a-S) hairs present. **Anal Segment**: Integument yellowish. Hair 1-X short, weakly branched; 2-X long, usually with 1, rarely 2, short to moderately long subbasal branches. Gills about length of saddle, sausage-shaped, ventral slightly longer than dorsal.

SYSTEMATICS. *Culex amazonensis* can be distinguished from the remaining known members of *Aedinus* by the following combination of attributes; in the **male genitalia**: (1) expanded portion of clasper sharply attenuating distally and (2) dorsal surface of sidepiece laterad of lobe with only a few bristles; in the **pupa**: (1) moderately long pinna of the trumpet and (2) tergite VIII uniformly lightly pigmented; and in the **larva**: (1) hair 5-C double, (2) 2-X with only 1 additional, short, subbasal branch, and (3) 5 pairs of subventral hairs (1,1a-S) on siphon.

We have seen adults of *amazonensis* from Panama, Colombia, Ecuador, Venezuela, Guyana, Suriname, French Guiana and Brazil. The immature stages are known only from Trinidad, Brazil, Suriname and Panama. There is no appreciable variation in the male genitalia of these different populations. We have made no attempt to check carefully the identity of all the other current synonyms of *amazonensis* listed in

Stone, Knight and Starcke (1959:280-281) and above, but from their descriptions and limited material at hand, *tapena* Dyar 1919, *paraplesia* Dyar 1922 and *hildebrandi* Evans 1923 appear to be conspecific with *amazonensis.*

BIONOMICS. The immature stages of *amazonensis* have been found usually in swamp margins and root caves in the swamp interior, and occasionally in ground pools, at low elevations in forested areas. Females are apparently zoophilic, but it is not known whether they are attracted to man. According to Galindo and Blanton (1955:70), this species is the commonest *Culex* of the Pacific coastal swamps of Panama. The males exhibit a very strong positive phototropism and are picked up in large numbers in light traps set near the breeding places. Studies on feeding patterns in Panama show that *amazonensis* prefers mammals, with 87.9% of the blood meal from this group. Most specimens (about 65%) fed on cricetid rodents, probably hamsters which were used as sentinel animals, or cotton rats which were common in the Tocumen swamps along the Pacific coast of Panama (Tempelis and Galindo 1975:205-209).

Culex amazonensis appears to be an important species in harboring a spectrum of arboviruses. Studies by Aitken, Spence et al. (1969:207-215) in Trinidad show that during a 10-year survey of arthropods for natural viral infections, 7 different viruses (VEE, Caraparu, Catu, Guamo, Wyeomyia, Bushbush and Aruac) have been isolated from *amazonensis.* While no viruses were detected during 1953-58 surveys, 7 viruses were isolated in 1959-63 when inoculated into mice. This shows that this species is potentially becoming important in harboring viruses, but it is not known whether it can transmit the viruses in nature by the bites of its females.

DISTRIBUTION (fig. 1). *Culex amazonensis* is known from the Pacific and Atlantic coasts of Panama, from Colombia, Ecuador, Venezuela, Guayan, Suriname, French Guiana, and Atlantic lowlands and coastal areas of Brazil.

Material Examined: 404 specimens; 81 males, 104 females, 67 pupae, 152 larvae; 54 individual rearings (19 larval, 23 pupal, 12 incomplete).

BRAZIL. **Para**: Belem, 2M, det. A. Toda [FH; E-822, E-232] ; Bosque Rodrigues Alves, 11 Apr 1941, W.H.W. Komp, 3M (KO 29-8) [UCLA] ; IPEAN, Catu Forest, 20 m, 25 July 1969, B.T. and B.G. Aitken, 1 pM (BRA 6-14), 1 L (6), 1 lpF (BRA 7-13), 1 lp (7-11), 1 L (7) [UCLA] ; IPEAN, Reserva de Aura, 1-10 m, 7 Aug 1969, B.T. and B.G. Aitken 1 lpM (BRA 22-14), 1 lpF (22-18), 2 pF (22-25, -44), 4 lP (22-24,-27,-38,-40), 8 L (22), 1 P (BRA 24); IPEAN, Reserva de Aura, 1-10 m, 8 Aug 1969, B.T. and B.G. Aitken, 2 pF (BRA 28-11,-13), 1L (28) [UCLA] ; Utinga (Xavier and Mattos (1975:247), 1M, det. A. Toda [FH; 15964] . **Sao Paulo**: Juquia, det. P.C.Antunes, Coutinho and J. Lane [FH; 1019, 1020, 1022, 3019, 5930, 5931, 5932] .

COLOMBIA. **Antioquia**: Murindo, 1924, L.H.Dunn, 2M [USNM] . **Boyaca**: Puerto Boyaca, Calderon, 170 m, 25 Nov 1970, C.J. Marinkelle, 1M (COM 496) with genitalia slide (701229-11) [UCLA] . **Caqueta**: Tres Esquinas, Los Alicangaros, 190 m, 8 Aug 1970, C.J. Marinkelle, 12F (COM 494) [UCLA] . **Cordoba**: Monteria, Turipana, 10 m, 5-6 Oct 1969, W.A. Page, 5M, 9F (COL 422) [UCLA] . **Meta**: Puerto Porfia, 160 m, 9 Sept 1971, C.J. Marinkelle, 1F (COM 595) [UCLA] . Villavicencio, Finca Porvenir, 450 m, 22 July 1971, C.J. Marinkelle, 1M (COM 530) [UCLA] . **Santander**: Lebrija, 900 m, 10 Apr 1966, C.J. Marinkelle, 4F (COM 64A); 12 Apr 1966, C.J. Marinkelle, 9F (COM 64C) [UCLA] . **Locality unspecified**: F.A. Miller, 1F [USNM] .

ECUADOR. **Los Rios**: Babahoyo, Levi-Castillo, 1M, 5F [USNM] . **Napo**: Coca, Isla Pompeya, 250 m, 19-26 May 1965, L.E. Pena G., 10F (ECU 19) [UCLA] . Cuyabeno, Tarapoa, 300 m, 25 May 1974, D.J. Pletsch, 1Mgen (ECU 228/74-307) [UCLA] . **Locality unspecified**: May 1974, D. J. Pletsch, 1L (ECU 215) [UCLA] .

FRENCH GUIANA. **Guyane**: Cayenne, Mont Cabassou, 30 m, 31 Jan 1965, T.H.G. Aitken, R. Martinez and A. Guerra, 1M, 1F (FG 15); foret de Cabassou, 4 Sept 1967, J. Clastrier, 1M (FGC 3247-19); foret de Cabassou, 10 Jan 1968, E.N. DeFreitas, 2M (FGC 3299-45,-76,-97,-121), 3Mgen (3299-166,-181,-194); foret de Cabassou, 21 Feb 1968, J. Clastrier, 1M (FGC 3305-3); foret de

Cabassou, 21 Aug 1968, J. Clastrier, 1M (FGC 452-9); foret de Cabassou, 11 Sept 1968, J. Clastrier, 2M (FGC 467-16,-26), 2Mgen (467-70,-75) [UCLA]. Degrad des Cannes, Gravier, Pascaut (Fauran 1961b:43). Kaw, 5 m, 6 Mar 1969, J. Clastrier, 1F (FGC 3996) [UCLA]. Remire, Pripris Cabassou near Port Beauregard, 5 m, 13 Mar 1967, R.X. Schick and J. Frederick, 1 lP (FG 126-42), 1F, 2L (126) [UCLA].

GUYANA. **Demerara**: Hyde Park, 1 Aug 1941, L.E. Rozeboom, 1M, 1F (BGR 5) [UCLA].

PANAMA. **Bocas del Toro**: Almirante, 10 m, 29 Apr 1963, A. Quinonez, 2M (PA 288); 14 or 15 Apr 1964, A. Quinonez, 1F (PA 666) [UCLA]. **Canal Zone**: Mojinga Swamp, 3 Aug 1932, 1M; Aug 1932, 6Mgen [USNM]. **Darien**: El Real, 8 Aug 1952, 1M (GML 01325) [USNM]. **Panama**: Pacora, 16 Oct 1946, W.H.W. Komp, 1M [USNM]. Tocumen, 1 Oct 1946, W.H.W. Komp, 1M; 10 Oct 1946, W.H.W. Komp, 2M [USNM]; 5 m, 11 Sept 1963, A. Quinonez, 1 lpM (PA 553-14) [UCLA]. **No data**: 1Mgen [USNM].

SURINAME. **Para**: Onverwacht, 10 m, 7 Apr 1967, H. deKruif and Nur, 1 pM (SUR 226-100), 4L (226), 1 lpF (SUR 227-20) [UCLA]. **Suriname**: Paramaribo, Ma Retraite, 5 m, 22-27 Aug 1963, P. Bolwerk, 2M (SUR 17) [UCLA].

TRINIDAD. **Nariva**: Bush Bush Forest, Nariva Swamp, near sea level, 15 Sept 1959, T.H.G. Aitken, 2M; 27 Nov 1963, M. Takahashi, 1F; 4 Dec 1963, M. Takahashi, 1M [USNM]; 27 Dec 1963, TRVL, 1M (TR 22) with genitalia slide (660531-6), 2F, 5P, 8L (TR 22); 16 Jan 1964, T.H. G. Aitken, 1M (TR 32) with genitalia slide (660420-3); 18 Feb 1964, TRVL, 4L (TR 74), 1 lpM (TR 75-137), 1 lpM (TR 76-138), 1 lP (76-139), 3L (76), 4L (TR 80); 17 Mar 1964, TRVL, 3L (TR 208); 23 Mar 1964, TRVL, 1L (TR 236); 31 Mar 1964, TRVL, 2L (TR 243), 1L (TR 244), 1 L (TR 245), 3L (TR 246); 20 Apr 1964, TRVL, 3 pF (TR 347-126-128), 1L (347), 3L (TR 348), 1 lP (TR 349-160), 4L (349), 1 pM (TR 350-126), 2L (350), 1 pM (TR 351-127), 2 pF (351-121, -126), 2 pM (TR 352-127,-128), 1 lpF (TR 353-137), 1 pM (353-125), 4 pF (353-122-124,-128), 1 pM (TR 354-130), 1 pF (354-129); 28 Apr 1964, TRVL, 1 lpM (TR 358-193), 1L (TR 359), 1 lP (TR 360-116), 1L (TR 361), 3L (TR 362), 4L (TR 363); 19 May 1964, TRVL, 1 lpF (TR 415-115), 1 lP (415-120), 2L (415); 26 May 1964, TRVL, 1L (TR 421), 1L (TR 422), 2L (TR 423); 2 June 1964, TRVL, 1 lP (TR 433-130), 3L (433), 1 lp (TR 434-138), 1L (434), 1 lP (TR 435-133), 2 lpF (TR 436-139,-140), 2L (TR 438), 1 lpF (TR 439-140), 1 lpF (TR 440-186); 9 June 1964, TRVL, 1 lpF (TR 447-160), 1 lpF (TR 448-182); 31 July 1964, TRVL, 2L (TR 580), 4L (TR 581), 7L (TR 582), 6L (TR 583); 29 Mar 1965, TRVL, 2L (TR 1065), 1L (TR 1067), 1L (TR 1070), 1L (TR 1071) [UCLA]. **St. Andrew**: Coryal, 50 m, 18-19 June 1964, A. Guerra, 3F (TR 499) [UCLA]. Esperanza Estate, 6-7 Oct 1969, T.H.G. Aitken, 1M [USNM]. La Fortune Estate, 20 Nov 1959, T.H.G. Aitken, 1M [USNM]. Rio Grande Forest, 4 Oct 1958, T.H.G. Aitken, 1M [USNM]. Turure Forest, 30 m, Oct 1966, F. Guerra, 1F (TR 1618) [UCLA]. Valencia Road 6 milepost, 30 m, 1 Oct 1964, A. Guerra, 1 lpM (TR 743-105), 1 lpF (743-105), 3M, 2F, 5P, 2L [UCLA]. **St. George**: Agua Santa, 30 m, 15 July 1965, A. Guerra, 3L (TR 1253); 29 July 1965, A. Guerra, 1 lpF (TR 1292-20), 1 pF (1292-101), 1P, 1L (1292); 12 Aug 1965, A. Guerra, 10L (TR 1317) [UCLA].

VENEZUELA. **Monagas**: Caripito, July 1937, P. J. Anduze, 1Mgen [USNM]. **Zulia**: Catatumbo River, L.H. Dunn, 2M, 1Mgen, 11 F [USNM]. **Locality unspecified**: 11 Feb 1973, CDC, 1F (VZ 423) [UCLA]. **No data**: 1Mgen [USNM]; 1M, det. P.J. Anduze [FH; 10107].

2. Culex (Aedinus) clastrieri Casal & Garcia

Figs. 1,5

1968. *Culex (Eubonnea) clastrieri* Casal and Garcia 1968:119-120. *TYPE: *Holotype* male, Belem, Para, Brazil, 29 Nov 1959, Eber and Evangelista [INM].

Culex (Aedinus) clastrieri of Stone (1970:164); Belkin, Schick and Heinemann (1971:27); Knight and Stone (1977:195); Heinemann and Belkin (1978b:407).

Culex (Eubonnea) clastrieri of Xavier and Mattos (1975:247, as *Eubonnea*).

FEMALE. Unknown but probably very similar to *amazonensis* in coloration.

MALE. Wing: 2-3 mm. Proboscis: 1.6 mm. Forefemur: 1.35 mm. Very similar to *amazonensis* in general features and coloration, differing in the following. Erect

scales on vertex brown. Pleural integument light brown. Abdominal tergites completely brown; sternites dark scaled.

MALE GENITALIA (fig. 5). Diagnostic characters as in key. **Segment IX**: Tergite lobes distinctly separated, digitform, each with 8-10 short, weak apical setae. **Sidepiece**: Ovate, length about 2.0 of greatest width; lateral surface with longer bristles, sternal side with shorter setae; scales present on basolateral and sternal surfaces; 3 broad saberlike setae and 3 rounded bristles distad, and a dense patch of rounded bristles (25-30) laterad of lobe. **Lobe**: Submedian in position, stem distinct, undivided; appendage moderately long, pointed, about 0.7 of stem; stem with a subbasal and a subapical seta. **Clasper**: Long, about 0.65 length of sidepiece; expanded subapically, gradually tapering distally; expanded region bearing external ridges continued proximally and distally as fine striations; spiniform short, simple. **Lateral Plate**: Basal hook broadly sclerotized and strongly curved; apical process broadly rounded and denticulate; sternal part split into 2 short processes. **Proctiger**: Cercal sclerite short, triangular; cercal setae absent. Paraproct with 6 blunt apical teeth.

SYSTEMATICS. *Culex clastrieri* is known only by the male and can be distinguished from other species of *Aedinus* in the **male genitalia** by the combination of: (1) expanded portion of clasper gradually tapering distally, (2) dorsal surface of sidepiece laterad of lobe with a dense patch of bristles, (3) stem of lobe with a subbasal and a subapical seta, and (4) moderately long, pointed rod on stem of lobe.

We have seen only 3 males of *clastrieri* from French Guiana, and they appear to be similar to the description of the type.

BIONOMICS. The immature stages are unknown but will probably be found in swamp margins and root caves in swamp interiors. The 3 males from French Guiana were caught overnight (1700-1000 h) in a Chamberlain light trap in a partially cut forest.

DISTRIBUTION (fig. 1). *C. clastrieri* has been reported from coastal areas of Para, Brazil and French Guiana.

Material examined: 4 specimens; 4 males; no individual rearings.

BRAZIL. **Para**: Belem, 29 Nov 1969, Eber and Evangelista, 1M [INM, holotype].

FRENCH GUIANA. **Guyane**: Cayenne, Raban, 5 m, 2-3 Feb 1965, T.H.G. Aitken, R. Martinez and A. Guerra, 3M (FG 43) [UCLA].

3. Culex (Aedinus) guyanensis Clastrier

Figs. 1,5

1970. *Culex (Eubonnea) guyanensis* Clastrier 1970:115-118. TYPE: *Holotype* male ([FGC] 3425-12), foret de Cabassou, Cayenne, French Guiana, 24 May 1968, J. Clastrier [MNHP].

Culex (Aedinus) guyanensis of Knight and Stone (1977:195).

Culex (Eubonnea) guyanensis of Fauran and Pajot (1974:103).

Culex (Aedinus) clastrieri of Heinemann and Belkin (1978b:437).

FEMALE. Unknown, but probably very similar to *amazonensis* in coloration.

MALE. Wing: 2.6 mm. Proboscis: 1.67 mm. Forefemur: 1.5 mm. Very similar to *amazonensis* in general features and coloration, differing in the following. Pleural integument brown. Abdominal tergites completely brown; sternites dark scaled.

MALE GENITALIA (fig. 5). Not seen; based on the description of Clastrier (1970: 116-118). Diagnostic characters as in key. **Segment IX**: Tergite lobes distinctly separated, digitiform, each with 9,10 short, weak, apical setae. **Sidepiece**: Ovate, length about 2.0 of greatest width; lateral surface with longer bristles, sternal side with shorter setae; scales present on basolateral and sternal surfaces; 2 broad saberlike setae and 4 rounded bristles distad, and a dense patch of about 25 bristles laterad of

lobe. **Lobe:** Submedian in position, stem distinct, undivided; appendage short, blunt apically, about 0.5 of stem; stem with a subapical seta. **Clasper:** Long, about 0.7 length of sidepiece; expanded subapically, gradually tapering distally; expanded region bearing external ridges, continued proximally and distally as fine striations; spiniform short, simple. **Lateral Plate:** Basal hook broadly sclerotized and strongly curved; apical process broadly rounded and denticulate; sternal part split into 2 short processes. **Proctiger:** Cercal sclerite and paraproct apparently as in *amazonensis.*

SYSTEMATICS. *Culex guyanensis* is known only by the holotype male from Cayenne, French Guiana and is separated from other members of *Aedinus* in the **male genitalia** by the combination of: (1) expanded portion of clasper gradually tapering distally, (2) dorsal surface of sidepiece laterad of lobe with a dense patch of bristles, (3) stem of lobe with only 1 subapical seta, and (4) short, blunt appendage on stem of lobe.

The holotype male of *guyanensis* appears to be very similar to *clastrieri* in general features and coloration.

BIONOMICS. The immature stages of *guyanensis* are unknown but will probably be found in swamps. The holotype male was caught in a light trap, and therefore like other species of *Aedinus* it appears to be nocturnal.

DISTRIBUTION (fig. 1). *Culex guyanensis* is known only from its type locality in French Guiana.

Material examined: 1 specimen; 1 pinned male (holotype; genitalia not seen); no individual rearings.

FRENCH GUIANA. **Guyane:** Cayenne, foret de Cabassou, 24 May 1968, J. Clastrier, 1M (holotype, [FGC] 3425-12) [MNHP].

4. Culex (Aedinus) accelerans Root

Figs. 1,6,7

1927. *Culex (Aedinus) accelerans* Root 1927:581. *TYPE: *Holotype* male, Porto das Caixas, Rio de Janeiro, Brazil, 15 Apr 1925, F.M. Root [USNM].

Culex (Aedinus) accelerans of Edwards (1932:220); Lane (1939:80; 1953:386); Galindo and Blanton (1955:69-70); Stone and Knight (1957:58); Fauran (1961b:43); Belkin (1968b:11); Belkin, Schick and Heinemann (1971:27); Knight and Stone (1977:194); Heinemann and Belkin (1978a: 183; 1978b:407,437,445; 1978c:537).

Culex (Eubonnea) accelerans of Stone, Knight and Starcke (1959:280); Stone (1961:47); Forattini (1965:36,186,187); Aitken, Spence et al. (1969:210,212-213).

FEMALE. Wing: 2.6-2.7 mm. Proboscis: 1.4-1.5 mm. Forefemur: 1.4 mm. Abdomen: 2.0-2.1 mm. Similar to *amazonensis* in general features and coloration, differing in the following. Erect scales on vertex brown. Pleural integument dark with a smoky bluish gray iridescence. Abdominal tergites completely dark; sternites dark scaled.

MALE. Wing: 2.50-2.55 mm. Proboscis: 1.50-1.55 mm. Forefemur: 1.4 mm. Similar to female in general features. Palpus short, about 0.2 length of proboscis.

MALE GENITALIA (fig. 6). Diagnostic characters as in key. **Segment IX:** Tergite lobes moundlike, distinctly separated, each bearing a subbasal digitiform appendage with 5,6 short, weak apical setae. **Sidepiece:** Ovate, length about 2.0 of greatest width; tergal and lateral surfaces with longer bristles, sternal side with shorter setae; scales on lateral surface. **Lobe:** Submedian in position, stem distinct, undivided; apex with 2 closely appressed pointed sabers; 1 subbasal seta on stem of lobe.

Clasper: Long, about 0.7 length of sidepiece; uniformly stout up to 0.7 and attenuate distally; a distinct subapical seta on distal 0.8; spiniform short, simple. **Lateral Plate:** Basal hook broadly sclerotized and strongly curved; apical process broadly rounded and denticulate; sternal part split into 2 short processes. Cercal sclerite short, triangular; cercal setae absent. Paraproct with 5,6 blunt apical teeth.

PUPA (fig. 6). Abdomen: 2.3-2.7 mm. Trumpet: 0.55-0.60 mm; index 7.0-7.5. Paddle: 0.65-0.75 mm. As described for the subgenus with the following additional features. Diagnostic characters as in key. **Cephalothorax:** Integument with characteristic pattern of pigmentation; middorsal ridge areas, lateral and posterior parts of wing case, basal areas of trumpet and leg cases moderately pigmented, rest lighter. Hair 4-C usually double; 5-C usually 5-branched (4-7) and subequal in length to 4-C; hair 7-C usually triple (2-4); hairs 8,9-C usually double (2-3). **Trumpet:** Moderately pigmented, apical flare indistinct; pinna short, about 0.2 length of trumpet; tracheoid distinct; central area darker. **Metanotum:** Hair 10-C multiple (5-11), weakly branched; 11-C single; 12-C usually 4-branched (2-4). **Abdomen:** Except for tergites V,VI,VIII uniformly lightly pigmented; tergites V,VI and median and lateral areas of VIII moderately pigmented. Hair 1-II multiple (16-28), weakly branched, indistinctly resembling float hair (1-I); hair 1-III-VI multiple, usually with 3-8 branches; 2-III mesad and 2-IV-VII laterad of hair 1; hair 9-VII,VIII single; 4-VIII usually double (2-4). **Paddle:** Lightly pigmented; pigmented spot apically at level of midrib; apex smoothly rounded. Male genital lobe extending to 0.37, female to 0.17-0.18 of paddle.

FOURTH INSTAR LARVA (fig. 7). Head: 0.6 mm. Siphon: about 1.5 mm. Anal Saddle: 0.3 mm. As described for the subgenus, with the following additional features. Diagnostic characters as in key. **Head:** Width about 1.5 of length. Mental plate with 8 (7-9) lateral teeth. Hair 4-C usually double (2,3), cephalad of 5-C; hair 5-C single; 7-C with 5-7 strong barbed branches, extending to base of antenna; 11-C with 4-7 weak branches. **Antenna:** Integument yellowish, spiculate to base of 1-A; hair 1-A with 23-25 barbed branches. **Thorax:** Integument glabrous. Hairs unbranched or with branches of varied length, not stellate. **Abdomen:** Integument glabrous. Hairs 1,2,4,11,13-I, 1,2,5,9,13-II, 1,2,5,7,9,13-III-VI, 1,2,5,8,10,13-VII unbranched or with branches of varied length and thickness, never stellate; 6-I,II long, double, branches subequal; 1-I long, single; 7-II short, multiple; 6-III-V moderately long, at least triple, branches subequal; 6-VI shorter, usually with 4 subequal branches (3-5). **Segment VIII:** Comb scales spatulate, 21-24 in number, apexes fringed. Hair 2-VIII usually double (1,2); 5-VIII double (2,3). **Siphon:** Integument yellowish, with a narrow basal dark ring; long, index about 14.0. Pecten with 15 (14-16) teeth, extending to basal 0.3; each tooth with 1 large and 1,2 small denticles on ventral border; with 6 pairs of subventral (1,1a-S) hairs. **Anal Segment:** Integument yellowish. Hair 1-X short, weakly branched; 2-X long, with 2 short to moderately long subbasal branches. Gills about length of saddle, sausage-shaped, dorsal subequal to ventral.

SYSTEMATICS. *Culex accelerans* can be separated from the other members of the subgenus in the **male genitalia** by: (1) simple clasper without subapical enlargement, (2) absence of specialized setae on sidepiece, and (3) 2 appressed appendages on lobe; in the **pupa** by: (1) short pinna and (2) pigmented area on tergite VIII; and in the **larva** by: (1) hair 5-C single, (2) 2-X with 2 additional short, subbasal branches, and (3) 6 pairs of subventral hairs (1,1a-S) on siphon.

We have examined adults of *accelerans* from Panama, Colombia, Trinidad, Guyana and French Guiana, and immatures from all the above countries except Colombia.

All populations appear to be similar in male genitalic structures and characters in immature stages.

BIONOMICS. Immature stages of *accelerans* have been found largely along swamp margins and once in a canal in Guyana. Biting studies in Trinidad with chickens as bait 55 feet above the ground showed that this species is a night biter. It is not known whether it is attracted to man.

Culex accelerans appears to be another species of *Aedinus* harboring arboviruses. During a 10-year survey of arthropods for natural viral infection by the Trinidad Regional Virus Laboratory, 3 viruses (VEE, Caraparu and Nepuyo) were isolated from *accelerans.* While no viruses were detected during surveys in 1953-1958, 3 viruses were isolated in the period 1959-1963 when specimens were inoculated into mice (Aitken, Spence et al. 1969:210). It is not known, however, whether females of *accelerans* can transmit the viruses in nature by their bites.

DISTRIBUTION (fig. 1). *Culex accelerans* is known from the Pacific coast of Panama east of Canal Zone, from Colombia, Trinidad, Guyana, French Guiana and the coastal lowlands of Brazil. It is probably present in Venezuela and Suriname.

Material examined: 152 specimens; 33 males, 16 females, 22 pupae, 81 larvae; 24 individual rearings (13 larval, 4 pupal, 7 incomplete).

BRAZIL. **Rio de Janeiro**: Porto das Caixas, 15 Apr 1925, F.M. Root, 1M [USNM, holotype].

COLOMBIA. **Boyaca**: Puerto Boyaca, Lago de Palagua, 145 m, 24 Aug 1971, C. J. Marinkelle, 1M (COM 590) [UCLA]. **Locality unspecified**: Kerr, 1Mgen (512) [USNM].

FRENCH GUIANA. **Guyane**: Cayenne, Mont Cabassou, 5 m, 31 Jan-1 Feb 1965, T.H.G. Aitken, R. Martinez and A. Guerra, 1F (FG 17), 6M (FG 18); Mont Cabassou, 30 m, 3-4 Feb 1965, T. H.G. Aitken, R. Martinez and A. Guerra, 2M (FG 46); foret de Cabassou, 10 Jan 1968, E. N. De Freitas, 1Mgen (FGC 3299-12); foret de Cabassou, 19 Jan 1968, E. N. DeFreitas, 2Mgen (FGC 33 01-45,-48); foret de Cabassou, 30 July 1968, J. Clastrier, 1Mgen (FGC 437-14); foret de Cabassou, 11 Sept 1968, J. Clastrier, 2Mgen (FGC 467-3,-10); foret de Cabassou, 19 Sept 1968, J. Clastrier, 1Mgen (FGC 473-7); Montagne Tigre (Fauran 1961b:43); Raban, 5 m, 3 Feb 1965, T. H. G. Aitken, R. Martinez and A. Guerra, 1 lpM (FG 37-17), 2L (37); Raban, 2-3 Feb 1965, T. H. G. Aitken, R. Martinez and A. Guerra, 1M (FG 43) [UCLA]. Matoury, foret de Cogneau, 5 m, 3 May 1968, J. Clastrier, 1Mgen (FGC 3416-51) [UCLA]. Remire, Pripris Cabassou near Pont Beauregard, 5 m, 13 Mar 1967, R.X. Schick and J. Frederick, 2 lpM (FG 126-40,-41), 1 lP (126-43), 1 l (126-42), 2 M (126) [UCLA]. **Inini**: Degrad Edmond, Riviere Comte (Fauran 1961b:43).

PANAMA. **Darien**: El Real, 21 July 1952, MTA, 1M (01290) [USNM]. **Panama**: Tocumen, 5 m, 9 Oct 1963, A. Quinonez, 2 lpF (PA 558-102,-103), 2 lP (558-105,-108), 1L (558) [UCLA]; Galindo and Blanton (1955:70).

TRINIDAD. **Nariva**: Nariva Swamp, Bush Bush Forest, near sea level, 21 Apr 1964, TRVL, 5L (TR 340), 1 pF (TR 341-133), 2L (341), 4L (TR 342), 1 lpF (TR 343-136), 4L (343), 1 lP (TR 344-127), 3L (TR 345), 4L (TR 346); 5 May 1964, TRVL, 1 lp (TR 376-132), 3L (TR 377); 9 June 1964, TRVL, 2 lpM (TR 445-159,-164), 1 lP (TR 446-1), 1 lP (TR 447-150), 2 lpF (TR 448-158,-159); 7 July 1964, TRVL, 19L (TR 544); 31 July 1964, TRVL, 1L (TR 581), 1L (TR 582); 11 Sept 1964, TRVL, 2L (TR 688); 16 Oct 1964, TRVL, 2 lpM (TR 772-107,-108), 1 lpF (772-109), 9L (772); Sept 1965, TRVL, 6F (TR 1438) [UCLA]; 1-15 Sept 1959, T.H.G. Aitken, 1M; 2-22 Sept 1959, T.H.G. Aitken, 1M [USNM]. **St. Andrew**: Rio Grande Forest, 2-9 Oct 1958, T. H.G. Aitken, 1M, 1Mgen, 1F [USNM]. **St. Patrick**: Bonasse, Lillette Swamp, 29 July 1966, A. Guerra, 4L (TR 1568) [UCLA].

SUBGENUS *TINOLESTES* Coquillett 1906

INTRODUCTION

Tinolestes was proposed as a distinct genus by Coquillett (1906a:185) with the new species *latisquama* Coquillett 1906 from Puerto Limon, Costa Rica as its type. Howard, Dyar and Knab (1915:303-305) synonymized *Tinolestes* with *Culex,* but Dyar (1918:102) elevated it to subgeneric rank within *Culex.* In 1928, Dyar placed *latisquama* in the subgenus *Melanoconion,* and as a consequence *Tinolestes* became a synonym of *Melanoconion.* Subsequently Lane (1953:387) restored *Tinolestes* to subgeneric rank, but he synonymized the subgenera *Micraedes* Coquillett, *Isostomyia* Coquillett and *Anoedioporpa* Dyar with it. In 1959, *Tinolestes* along with *Micraedes* and *Anoedioporpa* were lumped into the subgenus *Aedinus* Bourroul by Stone, Knight and Starcke on the basis of a short palpus in the male. But according to Belkin (1968b:11), this character occurs independently in several unrelated phylads, and therefore he elevated *Tinolestes* Coquillett 1906 again to subgeneric rank within *Culex* with only one included species. In the present study, *Tinolestes* is treated as a distinct subgenus of *Culex* with *latisquama* as its type and only species.

TAXONOMIC TREATMENT

Figs. 8-11

1906. *Tinolestes* Coquillett 1906a:185. *TYPE SPECIES: *Tinolestes latisquama* Coquillett 1906:185, Puerto Limon, Costa Rica; only included species.

Culex (Tinolestes) of Dyar (1918:92,102; 1923b:187); Bonne and Bonne-Wepster (1925:278); Belkin (1968b:11); Knight and Stone (1977:272).

Culex (Tinolestes) in part of Lane (1953:387); Galindo and Blanton (1955:70); Fauran (1961:48).

Culex (Aedinus) in part of Stone, Knight and Starcke (1959:281); Stone (1961:47; 1963:135; 1967:218); Belkin (1962:179); Belkin, Schick and Heinemann (1965:13); Forattini (1965:31, 32,34,35,185,193); Bram (1967:18).

Culex (Melanoconion) in part of Dyar (1928:336-337); Edwards (1932:212,213); Komp (1935:3); Lane (1939:66); Rozeboom and Komp (1950:78,92,106); Belkin and Hogue (1959:421).

Tinolestes of Coquillett (1906b:17,24; 1910:615); Theobald (1910:627).

FEMALE (fig. 9). Small, inornate species, dark brown to black and with unbanded legs. **Head:** Eyes not distinctly separated above antennae. Decumbent scales narrow, linear dorsally, broader on sides and venter, predominantly dark, a few scales whitish laterally. Erect scales on occiput moderately long, dark, forked apically and extending to sides of vertex. Orbital and interorbital bristles strong; upper orbitals 6, 7 pairs, heavier, longer and more widely spaced than lower. Clypeus bare, dark brown. Proboscis distinctly longer than forefemur, entirely dark scaled, with a few basal bristles. Palpus short, about 0.2 length of proboscis, 4-segmented; segments 1 and 2 ankylosed, without scales; segment 4 about 2.0 length of segment 3, both dark scaled. Antenna slightly longer than proboscis; torus dark brown, with a few short setae mesally; flagellar segments 2-13 with 6 moderately long bristles in basal whorls. **Thorax:** Integument dark brown. Mesonotum with narrow, curved, dark brown scales except along a pair of narrow inner dorsocentral "bare lines" extending from anterior margin to 0.75 of its length. Acrostichal bristles absent. Bristles on anterior promontory distinct; dorsocentrals, prescutellars and supraalars present; 3,4 posterior

fossal and 1 parascutellar developed. Antealar area above paratergite with scattered dark scales. Median scutellar lobe with 5,6 long and 6 short marginal bristles, and a large patch of narrow dark scales; lateral lobe with 4 long and 3 short marginal bristles, and a small patch of narrow dark scales. Paratergite bare. Pleuron brown. Bristles present on *apn, ppn, ppl, stp, pra* and upper *mep*; propleural area with at least 20-25 bristles; middle *mep* with a patch of short bristles; metameron with 3,4 short setae. Pleural scaling restricted to *apn, ppn, stp* and middle *mep*; *stp* with a large patch of flat, translucent scales covering the entire posterior half. **Legs**: Dark scaled. Claws simple on all legs. **Wing**: Veins entirely dark scaled; all scales squamous, moderately broad. **Haltere**: Stem pale brown; knob entirely dark scaled. **Abdomen**: Laterotergite with many short to moderately long bristles. Tergites II-VII with light basolateral patches, rest dark scaled. Sternites predominantly creamy, dark scales restricted to apical 0.3.

FEMALE GENITALIA (fig. 9). **Segment VIII** partially retracted into segment VII, apex visible, numerous bristles and scales present; tergite VIII about 0.5 of sternite; apex of sternite distinctly emarginate in the middle. **Tergite IX** broad, sclerotized; lobes faintly visible, each bearing 15,16 moderately long setae; **sternite IX** narrow laterally, membranous in the middle. **Postgenital plate** deeply emarginate in the middle, producing 2 conical lobes each bearing 3 apical and 2,3 subapical setae. **Cowl** moderately developed, finely setose, bowed laterally to join tergite IX and articulating with sigma. **Insula** well developed, poorly sclerotized, with a group of 13 moderately long setae, continued laterally as a narrow **sigma**. **Cerci** short, compressed, approximate, each with many short to moderately long setae; area between cerci bilobed. **Spermathecae** 3, one a little larger than others.

MALE (fig. 9). Coloration similar to females; sexual dimorphism of head appendages marked. Proboscis longer than forefemur. Palpus porrect, slender, about 0.45-0.48 of proboscis length; 5-segmented; segments 1 and 2 ankylosed, without scales; segments 3 and 4 elongated, partly ankylosed, segment 4 about 1.3 of segment 3, both dark scaled; segment 5 short, about 0.25 of 4 and dark scaled. Antenna subequal in length to proboscis; whorls of flagellar segments 1-12 of antenna strongly developed, with at least 20 long bristles; segments 12 and 13 elongate, 13 about 1.4 longer than 12; torus not swollen. Claws of foreleg and midleg enlarged, unequal; larger claw of foreleg with a submedian tooth, that of midleg without tooth; both claws with basal spicules; hind claws as in female.

MALE GENITALIA (fig. 10). **Segment IX**: Lobes of tergite IX distinct, heavily sclerotized, flattened, bearing long, erect bristles. **Sidepiece**: Roughly triangular in outline; length about 2.0 basal width; with longer bristles on tergal and lateral surfaces, sternal side with shorter setae; a few scales on basolateral surface; an elongate patch of short to moderately long bristles on tergal surface basolaterad of subapical lobe; caudal and basomesal areas without bristles. **Lobe** distinct, subapical in position, undivided. **Clasper**: Simple, stout, bearing an external crest; spiniform simple, apical. **Phallosome**: Lateral plate of aedeagus with a broadly sclerotized "basal hook," a caudally directed sinuous apical process and a sternal spine. **Proctiger**: Basolateral sclerotization well developed, digitiform; apex of paraproct with a crown of 22-24 teeth; cercal setae distinct.

PUPA (fig. 10). **Cephalothorax**: Middorsal ridge moderate. Integument uniformly lightly pigmented. All hairs present, variously developed. Hair 5-C moderately long, weakly developed, subequal in length to 4-C; hair 6-C smaller than and cephalad of 7-C; hairs 8,9-C widely separated, double or triple; 8-C cephalad and 9-C distinctly caudad of trumpet base. **Trumpet**: Not placed on tubercle; moderately long,

index 5.0-5.5; pigmentation moderate; tracheoid distinct, short; apical portion slightly flared; pinna short. **Metanotum**: Hair 10-C subequal in length to 11-C, multiple, weakly branched. **Abdomen**: Integument uniformly lightly pigmented. Hair 3-I double or triple; 1-II multiple, with at least 20 weak branches, faintly resembling float hair (1-I); hair 2-III submarginal, always mesad of 1-III; hair 5-IV,V long, single, extending beyond apex of succeeding segments; 5-VI shorter, barely extending to middle of succeeding segment; 6-II-VI usually single; 2-VI,VII always laterad of hair 1; hair 9-VII,VIII double, 9-VIII distinctly shorter than tergite VIII; hair 4-VIII double; 1-IX small, single. Lobes on posterior margin of sternum mesad of 9-VIII indistinct. Tergite VIII never overlapping base of tergite IX. **Paddle**: Uniformly lightly pigmented; longer than wide, apex smoothly rounded; midrib strongly differentiated; paddle margin without spicules; both paddle hairs (1,2-P) distinct, single.

FOURTH INSTAR LARVA (fig. 11). **Head**: Head capsule with faint imbrications; without lateral expansion on each side caudad of antenna. Labrum well differentiated dorsally. Ocular lobes indistinct. Mouthbrushes with numerous filaments. Collar moderately developed, narrow. Posterior tentorial pit a short distance from caudal border. Maxillary suture complete, but not extending caudolaterad to collar. Anterior border of labial plate truncate. Aulaeum with distinct filamentous spicules. Central tooth of mental plate not shouldered. Hair 0-C small, removed laterad of 1-C; hair 1-C strong, straight; 2,3-C apparently not developed; 4-6-C closely grouped together and caudad of level of 7-C; hair 5-C usually triple, 6-C single, both longer than antenna; 7-C multiple, with strong barbed branches; 8-C usually triple (2,3); hair 11-C with at least 5 (5-8) moderately long branches; 13-C closer to 11-C than 12-C; hairs 14,15-C slightly moved cephalad; basal maxillary hair (*bmh*) small, single; 16,17-C not developed. **Antenna**: Hair 1-A large, multiple, about 0.75 from base; other hairs short to moderately long, single. **Thorax**: Roughly oval in outline, slightly wider than long. Integument glabrous. Hairs 1-3-P on a distinct tubercle; 3-P with 6-10 weak branches; 14-P double; hairs 0-P, 1,13,14-M, 1,3,13-T with many weak branches, not stellate. **Abdomen**: Integument glabrous. Pigmentation uniform. Hair 2 never moved far cephalad of 1, always within posterior half of segment. **Segment VIII**: Comb in a patch of 4,5 irregular rows of scales. Hairs 1,2-VIII without basal tubercles or sclerotized plates. **Siphon**: Pecten teeth simple; 4 pairs of subventral (1,1a-S) and 2 pairs of subdorsal (2a-S) hairs on siphon; both subdorsals distad of subventral hairs; 2-S distinct, slightly curved, without a submedian branch. **Anal Segment**: Saddle complete; acus not developed; caudal margin without spines; lateral hair (1-X) short, multiple, submarginal. Hair 2-X long with 3 short to moderately long subbasal branches; 3-X long, single; ventral brush (4-X) with 6 pairs of branched hairs on a grid. Gills sausage-shaped, ventral slightly shorter than dorsal.

1. Culex (Tinolestes) latisquama (Coquillett)

Figs. 8,9,10,11

1906. *Tinolestes latisquama* Coquillett 1906a:185. *TYPE: *Lectotype* male (344c), Puerto Limon, Costa Rica, 25 Sept 1905, F. Knab (USNM, 8298; designation by Rozeboom and Komp 1950:92).

Culex (Tinolestes) latisquama of Dyar (1918:90,102; 1922a:95-96; 1923a:177; 1923b:188; 1925: 158,161,168); Bonne and Bonne-Wepster (1925:184,188,278); Lane (1953:387-389); Duret and Damasceno (1955:395); Galindo and Blanton (1955:70); Forattini (1958:175); Fauran (1961b:48); Belkin (1968b:11); Knight and Stone (1977:272); Heinemann and Belkin (1977a: 284; 1977b:443,453; 1978a:185; 1978c:497).

Culex (Aedinus) latisquama of Stone, Knight and Starcke (1959:282); Belkin, Schick and Heinemann (1965:13); Forattini (1965:34).
Culex (Melanoconion) latisquama of Dyar (1928:336-337); Edwards (1932:212,213); Lane (1939: 66); Rozeboom and Komp (1950:78,92,106); Belkin and Hogue (1959:421).
Culex latisquama of Dyar and Knab (1906:208,222); Howard, Dyar and Knab (1915:217,222,229, 303-305); Kumm, Komp and Ruiz (1940:387); Forattini, Rabello and Cotrim (1970:43).
Tinolestes latisquama of Coquillett (1910:615); Theobald (1910:627); Stone and Knight (1957: 52).

FEMALE (fig. 9). Wing: 2.70-2.75 mm. Proboscis: 1.65-1.70 mm. Forefemur: 1.4 mm. Abdomen: 1.6-1.7 mm. As described for the subgenus with the following additional features. **Head**: Decumbent and erect scales dark. Palpus short, dark scaled. **Thorax**: Pleuron brown, darker on *stp, psp* and *mep*; bristles on *ppl* strongly developed, at least 20 in number; scales on *stp* and middle *mep* moderately broad and translucent. **Legs**: Coxae with dark scales on external surfaces; trochanters with ventral dark scales. Forefemur and midfemur dark scaled anteriorly, posterior side creamy basally, rest dark; hindfemur creamy ventrally and dark scaled dorsally. Tibiae and tarsi of all legs dark. **Wings**: Scales on all veins dark, squamous and moderately broad. **Haltere**: Stem pale brown; knob entirely dark scaled. **Abdomen**: Basolateral light patches on tergites moderately broad, rest dark scaled; sternites creamy basally, dark scaled distally.

MALE (fig. 9). Wing: 2.55-2.60 mm. Proboscis: 2.0 mm. Forefemur: 1.50-1.55 mm. Similar to female in general features. Palpus moderately long, about 0.45-0.48 length of proboscis. Antenna subequal in length to proboscis.

MALE GENITALIA (fig. 10). **Segment IX**: Tergite lobes distinctly separated by a triangular bar; each lobe flattened, wider than long, bearing 20-22 long erect bristles inserted on distinct tubercles. **Sidepiece**: Slightly more than 2.0 as long as wide, with a conically tapered tip; longer bristles on tergal and lateral surfaces, sternal side with shorter setae; a few scales on basolateral surface; a dense elongated patch of 30-35 moderately long bristles on tergal surface basolaterad of subapical lobe. **Subapical Lobe**: Bearing a smaller and a larger rod with cup shaped expanded tips, and a larger inner and a smaller outer seta laterad of rods; 4,5 short to moderately long simple setae distad of rods. **Clasper**: About 0.5 of sidepiece length, stout, slightly swollen in middle, bearing an external crest; 1 inner and 1 outer seta subapically; spiniform apical. **Lateral Plate**: Basal hook broadly sclerotized; apical process strongly sclerotized, sinuous, with a pointed recurved tip; sternal spine slightly recurved apically, pointing laterad from dorsal aspect. **Proctiger**: Cercal sclerite distinct, moderately long, digitiform, pointing caudad; cercal setae 2 in number. Paraproct with a crown of 22-24 apical blunt teeth.

PUPA (fig. 10). Abdomen: 2.50-2.55 mm. Trumpet: 0.35 mm; index about 5.0-5.5. Paddle: 0.65-0.70 mm. **Cephalothorax**: Hair 4-C laterad of 5-C; hair 6-C single, 7-C double, approximate; 8-C usually triple (2,3), cephalad of 9-C. **Trumpet**: Moderately long, brownish; contrasting with rest of cephalothorax; apex slightly flared. Pinna about 0.20-0.25 of total length. **Metanotum**: Hair 10-C multiple (7-11), closer to 11-C than to 12-C; hair 11-C double; 12-C usually triple (2,3). **Abdomen**: Integument lightly pigmented. Hair 1-I,II multiple, branches weak; 5-IV,V long, single, extending beyond apex of succeeding segments; 5-VI short, barely extending to middle of succeeding segment; 2-III-V mesad and 2-VI,VII laterad of hair 1; 9-II-VI caudolaterad of hair 6; hair 9-VII,VIII moderately long, double; 9-VIII shorter than length of tergite VIII. **Paddle**: Longer than wide. Midrib distinct; external buttress slightly developed; apex smoothly rounded, margin without spicules; both paddle

hairs (1,2-P) present, 2-P longer than 1-P. Male genital lobe extending to 0.47, female to 0.28 of paddle.

FOURTH INSTAR LARVA (fig. 11). Head: 0.75 mm. Siphon: 1.4-1.6 mm; index about 11.0-12.0. Anal Saddle: 0.35 mm. **Head**: Width about 1.2 of length; head capsule indistinctly imbricate. Hair 4-C short, double, anteriad of 5-C; hair 5-C long, usually triple (3,4); hair 6-C long, single; 7-C long, branched (4,5), extending to base of 1-A; hair 11-C multiple (5,5-8), weakly branched; 13-C multiple, closer to 11-C than to 12-C. Mental plate well developed, with 10 (9-11) lateral teeth. **Antenna**: Strongly pigmented, spiculose to base of 1-A; hair 1-A long, with 16-19 barbed branches. **Thorax**: Integument glabrous. Hairs unbranched or with branches of varied length and thickness, not stellate. **Abdomen**: Integument glabrous. Hairs 1,2,4, 11,13-I, 1,2,5,9,13-II, 1,2,5,7,9,13-III-VI, 1,2,5,8,10-13-VII unbranched or with branches of varied length and thickness, never stellate. Hairs 6-I,II, 7-I long, double, branches unequal; 7-II short, multiple (4-6); hair 6-III-V moderately long, double, subequal; 6-VI long, double, branches subequal. **Segment VIII**: Comb scales in an irregular patch of 4,5 rows, 50-69 in number; individual scale spatulate, apex fringed. Hairs 1-5-VIII double or triple. **Siphon**: Integument light brown, with wartlike spicules, base with a dark ring. Pecten extending to basal 0.25, teeth 12-15 in number; individual tooth without denticles. Hair 1-S distinctly caudad of last pecten tooth. Subventral hairs (1,1a-S) 4 pairs, short, at least double; subdorsal hairs (2a-S) 2 pairs, short, single, located on distal 0.25 of siphon. **Anal Segment**: Integument brown and indistinctly imbricate. Hair 1-X short, weakly branched (4,3-5); hair 2-X with 3 additional short to moderately long basal branches. Gills short, ventral smaller than dorsal.

SYSTEMATICS. *Tinolestes* can be readily separated from other subgenera of *Culex* in the New World by the following characters: in the **adults** by (1) strongly developed propleural bristles, (2) presence of a broad patch of translucent scales covering almost entire *stp,* (3) 3,4 short setae on metameron, and (4) distinct patch of scales and hairs on middle *mep.* The moderately long palpus of the male, about 0.45-0.48 length of proboscis, distinguishes it from most members of *Culex.* In the **male genitalia**, *Tinolestes* differs from other subgenera by the combination of: (1) morphology of the clasper, (2) position and structural components of the subapical lobe, (3) nature of the phallosome, and (4) number of apical teeth on the paraproct. In the **pupa**, *Tinolestes* can be distinguished by the combination of: (1) position of hair 2-VI, (2) hair 11-C always double, (3) hair 9-VII,VIII always double, and (4) hair 9-VIII shorter than tergite VIII. In the **larvae**, *Tinolestes* can be distinguished from most of the subgenera except *Aedinus* and *Lutzia* by the slightly imbricate head capsule; however, it is separated from *Aedinus* by the absence of an attached acus on the anal saddle, and from *Lutzia* by the structure of the mouthbrushes.

Tinolestes is undoubtedly a distinct subgenus of *Culex* that was erroneously lumped under *Aedinus* (Stone, Knight and Starcke, 1959:281-282). Later, Belkin (1968b:11-12) suggested separating the subgenera *Eubonnea* and *Aedinus* of Stone, Knight and Starcke (1959) into *Aedinus (=Eubonnea), Anoedioporpa, Micraedes* and *Tinolestes.* In spite of the similarities of *Tinolestes* with other subgenera of the *Melanoconion* complex, it is distinct in adults, immature stages and in ecology (breeding sites). Although there is a slight overlap with *Aedinus* and *Belkinomyia, Tinolestes* is a very distinct group and should be retained as a subgenus of *Culex.*

BIONOMICS. The immature stages of *latisquama* have been found in crabholes, and are often catholic in their association with other crabhole breeding mosquitoes. This species has been found with 6 species of *Deinocerites: curiche* Adames 1971,

colombianus Adames 1971, *epitedeus* (Knab 1907), *melanophylum* Dyar & Knab 1907, *panamensis* Adames 1971 and *pseudes* Dyar & Knab 1909; in addition, it is often associated with members of the Inflictus Group of *Culex (Culex).* Rarely it has been collected in association with *Anopheles (Anopheles) eiseni* Coquillett 1902 (CR 524, PA 573), *Culex (Melanoconion) iolambdis* Dyar 1918 (CR 525, PA 615) and *Culex (Lutzia) allostigma* (Howard, Dyar & Knab 1915) (CR 525).

Very little is known about the bionomics of the adults. Apparently the adults use crabholes as resting sites. The presence of a few engorged females in the collection suggests that they are zoophilic as they show no inclination to bite or even alight upon humans (Howard, Dyar and Knab 1915:305).

DISTRIBUTION (fig. 8). *Tinolestes* is primarily Central American in distribution. To date it has been collected from the Caribbean side of Honduras, Nicaragua and Costa Rica, and from the Pacific and Caribbean sides of Panama and Colombia.

The report of *latisquama* from Suriname (Stone, Knight and Starcke 1959:282) is erroneous, and the record of it on the basis of 1 male supposedly collected in 1906 by J.B. Vanduzee in Estero, Lee County, Florida, U.S.A. (Stone 1968:101) is probably due to an erroneous labelling (Belkin 1970:57-58), which occurred several times during the course of preparation of material for the studies on the "Mosquitoes of North and Central America and the West Indies" (Howard, Dyar and Knab). *Culex latisquama* may have a wider distribution in Central America, but extensive collections from different localities on both the Caribbean and Pacific sides should be made to ascertain this.

Material examined: 615 specimens; 99 males, 104 females, 98 pupae, 314 larvae; 91 individual rearings (65 larval, 18 pupal, 8 incomplete).

COLOMBIA. **Antioquia**: Turbo, Brazo del Coco, near sea level, 29 Aug 1967, A.J. Adames and A. Quinonez, 1 pM (COA 30-101), 5 lpM (COA 31-10,-11,-14,-15,-19), 7 lpF (31-12,-13,-16,-17, -20,-22,-23), 2 pM (31-100,-101), 11 L (31), 2 lpF (COA 32-10,-11), 2 lpF (COA 33-11,-12), 1 pM (33-100), 1 lP (33-10) [UCLA]. **Choco**: Coredo, El Naranjo, near sea level, 26 Aug 1967, A.J. Adames and A. Quinonez, 1 pF (COA 17-102); 31 Aug 1967, A.J. Adames and A. Quinonez, 1 lpF (COA 48-17), 2L (48), 2 lpM (COA 50-15,-17), 1 lpF (50-16) [UCLA]. **Magdalena**: Near mouth of Rio Buritaca, near sea level, May-June 1970, H.G. Henning, 20M, 22F (COA 100), 4L (COA 101), 1M (COA 102) [UCLA].

COSTA RICA. **Limon**: Cieneguita, June 1946, D.C.R. Butts, 1M [USNM]. Puerto Limon, 25 Sept 1905, F. Knab, 1M, 1Mgen, 8F (344c, type series) [UCLA, USNM]. Portete, near sea level, 30 Sept 1971, D. Schroeder, 1M, 1F (CR 399); 1-2 Oct 1971, D. Schroeder, 1M (CR 461); 2 Oct 1971, D. Schroeder, 1 lpM (CR 465-11), 3 lpF (465-13-15), 1 pM (465-110), 4 pF (465-100-102, 106); 7 Nov 1971, D. and K. Schroeder, 3 lpM (CR 520-31-33), 5 lpF (520-30,-34,-35,-56,-57), 6L (520), 1M (CR 523), 1 lpM (CR 524-61), 3 lpF (524-60,-62,-63), 1L (CR 525) [UCLA]. Westfalia, near sea level, 4 Dec 1962, C.L. Hogue and W.A. Powder, 1L (CR 76) [UCLA].

HONDURAS. **Cortes**: Puerto Cortes, Rio Mar, near sea level, 15 Aug 1967, A.J. Adames, 1 pM (HON 84-100) [UCLA]. **Colon**: Trujillo, Rio Cristales, near sea level, 7 Mar 1945, 1M [USNM].

NICARAGUA. **Zelaya**: Bluefields, near sea level, 12 Sept 1967, A.J. Adames and A. Herrera, 5 L (NIC 69), 2F (NIC 70), 6L (NIC 71); 25-26 Nov 1971, D. Schroeder, 1F (NIC 101). Punta Masaya, 26 Nov 1971, D. and K. Schroeder, 2 lpM (NIC 109-33,-34), 5L (109); 27 Nov 1971, D. and K. Schroeder, 2 lpF (NIC 111-20,-32), 2L (111); 27-28 Nov 1971, D. Schroeder, 1F (NIC 123); 28 Nov 1971, D. and K. Schroeder, 4 lpM (NIC 124-10,-11,-15,-16), 4 lpF (124-12-14,-16), 4 pM (124-100-103), 1P, 30L (124) [UCLA].

PANAMA. **Bocas del Toro**: Almirante, near sea level, 28 Apr 1963, A. Quinonez, 1L (PA 273), 1 pF (PA 275-101), 1 lp (275-102) [UCLA]; Feb 3, 1Mgen [USNM]. **Canal Zone**: Fort Sherman, 12 Nov 1919, J. Zetek, 1M [USNM]. Miraflores, July 1912, J. Zetek, 2F [USNM]. Mojinga Swamp, Aug 1932, 1Mgen; 12 June 1933, 1Mgen; 17 June 1952, MTH, 1M (01164); 18 Mar, 1M gen [USNM]; 10 m, 29 Jul 1972, J. H. Arnell, 1 lpM (PA 1149-14) [UCLA]. Rodman Naval Station, near sea level, 11 Dec 1965, R.X. Schick and A. Quinonez, 1 lpF (PA 888-20), 3 lpM (PA

889-11-13), 2 lpF (889-14,-16), 2 lp (889-10,-19), 1 lP (889-20), 1P (889); 12 Dec 1965, A. Quinonez, 1 lP (PA 891-17), 1P, 3L (891), 1 lP (PA 895-10), 1L (895); 15 Dec 1965, R.X. Schick and A. Quinonez, 1 lpM (PA 907-11), 1 lpF (907-10), 1 lpM (PA 908-10), 1 pM (908-101), 1P (908), 1 lpM (PA 909-10), 3 lpM (PA 910-11,-12,-14), 2 lpF (910-16,-19), 1 lP (910-15), 3M, 2P, 3L (910) [UCLA]. **Colon**: Maria Chiquita, near sea level, 6 Sept 1967, A. J. Adames, 1F (PA 1008) [UCLA]. Pina, near sea level, 30 Nov 1963, A. Quinonez, 1 lpF (PA 573-101), 1 pM (573-103), 23L (573), 1M, 2F (PA 574) [UCLA]. Portobelo, near sea level, 9 Dec 1963, A. Quinonez, 4L (PA 598); 11 Dec 1963, A. Quinonez, 1F (PA 604) [UCLA]. **Darien**: El Real, near sea level, 12 Jan 1964, A. Quinonez, 1L (PA 620); 13 Jan 1964, A. Quinonez, 4L (PA 621) [UCLA]. Jaque, near sea level, 18 Dec 1963, A. Quinonez, 17L (PA 611); 20 Dec 1963, A. Quinonez, 98L (PA 615) [UCLA]. **Panama**: El Libano, near sea level, 27 Aug 1963, A. Quinonez, 10M, 13F (PA 535); 26 Nov 1963, A. Quinonez, 14L (PA 566), 3M, 1F (PA 568) [UCLA]. **Locality unspecified:** Male, det. J. Lane [FH, 6577; Forattini, Rabello and Cotrim (1970:43)].

?U.S.A. **Florida**: Lee County, Estero, J.B. Vanduzee, 1M (with genitalia slide, no. 68-19) [USNM]. Probably erroneous record, see p. 25 and below.

NO DATA. A.H. Jennings, 6M, 5F [USNM]. 1Mgen [USNM]. Probably collected in Panama or Canal Zone as Jennings worked there. It is possible that the male supposedly from Florida (above) was actually collected by Jennings and misplaced and erroneously labelled.

SUBGENUS *ANOEDIOPORPA* Dyar 1923

INTRODUCTION

Anoedioporpa was proposed as a distinct subgenus of *Culex* by Dyar (1923b: 190), with *Culex conservator* Dyar & Knab 1906 as its type species. Besides *conservator,* Dyar's *Anoedioporpa* included *originator* Gordon & Evans 1922, *bifoliatus* Dyar 1922, *corrigani* Dyar & Knab 1907, *homoeopas* Dyar & Ludlow 1921 and *restrictor* Dyar & Knab 1906. All the other species we are including in this subgenus were previously assigned to different subgenera of *Culex* such as *Isostomyia* (Dyar 1918:102; Edwards 1932:217), *Melanoconion* (Dyar 1925:158; 1928: 336) or *Tinolestes* (Lane 1953:387). In 1959, Stone, Knight and Starcke included *Tinolestes, Micraedes* and *Anoedioporpa* in the subgenus *Aedinus* Bourroul 1904, and as a result all species were lumped into a composite group on the basis of a short palpus in the males. But as Belkin (1968b:11) indicated, this character has evolved independently in several unrelated phylads, and he elevated *Anoedioporpa* to subgeneric rank. In the present paper, *Anoedioporpa* is treated as a distinct subgenus of *Culex,* with 12 species assigned to it. As well as the species presently considered to be members of *Anoedioporpa* (Knight and Stone 1977:195-196), we are also including *restrictor* Dyar & Knab 1906, presently considered to belong to the subgenus *Microculex* (Knight and Stone 1977:269).

TAXONOMIC TREATMENT

Figs. 12-30

1923. *Anoedioporpa* Dyar 1923b:190. *TYPE SPECIES: *Culex conservator* Dyar & Knab 1906:221-222, St. Joseph, Trinidad; designation by Dyar (1923b:190).

Culex (Anoedioporpa) of Bonne and Bonne-Wepster (1925:184,260); Belkin (1968b:11).

Culex (Anoedioporpa) in part of Knight and Stone (1977:195-196).

Culex (Isostomyia) of Dyar (1918:92,102-103); Gordon and Evans (1922:327); Edwards (1932: 217-218); Senevet and Abonnenc (1939:112); Lane (1939:73); Anduze (1941a:16); Floch and

Abonnenc (1942:9; 1947:6); Lane and Whitman (1943:397); Arnett (1948:189; 1950:107); Lane (1949:255); Foote (1954:3,4); Horsfall (1955:547,548).

Culex (Aedinus) in part of Stone, Knight and Starcke (1959:281); Belkin (1962:179); Stone (1961: 47; 1963:135; 1967:218); Forattini (1965:31,32,34,35,185,193); Cova Garcia, Sutil and Rausseo (1966a:27; 1966b:342); Bram (1967:18).

Culex (Microculex) in part of Knight and Stone (1977:269).

Culex (Melanoconion) in part of Dyar (1925:158; 1928:336); Komp (1935:3).

Culex (Tinolestes) in part of Lane (1953:387); Duret and Damasceno (1955:393); Galindo and Blanton (1955:70); Fauran (1961:43).

FEMALES (fig. 13). Usually small, inornate species, tan to brown and with unbanded legs. **Head**: Eyes not distinctly separated above antennae. Decumbent scales narrow and linear dorsally, white; broader on sides and venter. Erect scales on occiput long, forked apically, light to moderately brown, extending to sides of vertex. Orbital and interorbital bristles strong; upper orbitals 5 pairs, heavier, longer and more widely spaced than lower. Clypeus bare, dark brown. Proboscis longer than forefemur, entirely dark scaled, with a few basal bristles. Palpus short, about 0.16 length of proboscis, 4-segmented; segments 1 and 2 ankylosed, without scales; segment 4 about 1.5 of segment 3, both dark scaled. Antenna slightly shorter than proboscis; torus brown, with a few short setae mesally; flagellar segments 2-13 with 6 moderately long bristles in basal whorls. **Thorax**: Integument tan to brown. Mesonotum predominantly with narrow, curved, auburn scales except along a pair of narrow inner dorsocentral "bare lines" extending from anterior margin to 0.75 of its length; anterior margin with narrow white scales. Acrostichal bristles usually absent on disc, present in *restrictor* and *corrigani.* Bristles on anterior promontory distinct; dorsocentrals, prescutellars and supraalars always present, variously developed; 1 posterior fossal and 1 parascutellar always developed. Antealar area above paratergite with scattered scales. Median scutellar lobe with 5,6 long and 6 short marginal bristles, and a large patch of narrow dark scales; lateral lobes with 3 long and 3 short marginal bristles, and a very small patch of narrow dark scales. Paratergite bare. Pleuron yellowish to tan. Bristles present on *apn, ppn, ppl, stp, pra* and upper *mep*; lower *mep* with or without a strong bristle; metameron bare. Pleural scaling restricted to *ppn* and *stp*; upper *ppn* with a few light to dark scales; *stp* with a few scattered, flat, translucent scales along bristles. **Legs**: Coxae with white scales on external surface; trochanters with ventral white scales. Forefemur and midfemur dark anteriorly, posterior side predominantly creamy, dark scales restricted to dorsal side; hindfemur predominantly creamy on both sides, dark scales only dorsally. Tibiae and tarsi of all legs with auburn to dark brown scales. Claws simple on all legs. **Wing**: Veins entirely dark scaled; plume scales on Rs, R_2 and R_3. **Haltere**: Stem pale; knob entirely dark scaled. **Abdomen**: Laterotergite with many short to moderately long bristles. Tergites II-VII with creamy basolateral patches, rest dark scaled. Sternites with creamy scales.

FEMALE GENITALIA (fig. 13). Only *conservator*, the type species, studied. **Segment VIII** partially retracted into segment VII, apex visible, numerous bristles and scales present; tergite VIII about 0.65 of sternite; apex of sternite slightly emarginate. **Tergite IX** uniformly narrow, lobes not prominent, with 8 moderately long setae. **Postgenital plate** about 0.6 length of cercus, not joined to cowl basally; apex broadly emarginate, with a patch of 16,17 scattered setae. **Cowl** moderately developed, finely setose, bowed laterally to join tergite IX and articulating with sigma. **Cerci** short, compressed, widely separated, with many short to moderately long setae; area between cerci not lobed. **Insula** poorly developed, with a group of 8-10 short

setae, continued laterally as finely setose sigma. **Spermathecae** 3, one a little larger than others.

MALES (figs. 13,28). Coloration similar to females; sexual dimorphism of head appendages marked. Proboscis longer than forefemur. Palpus porrect, about 0.16 length of proboscis, but subequal in *restrictor*; entirely dark scaled; 4-segmented (Conservator Group) or 5-segmented (Restrictor Group). Antenna subequal in length to proboscis; whorls of flagellar segments 1-12 strongly developed, with about 20-24 long bristles; segments 12 and 13 elongate, 13 about 1.45 of 12; torus as in females. Claws of foreleg and midleg enlarged, unequal; larger claw with a submedian and smaller with a basal tooth; both claws with basal spicules. Hindclaws as in females.

MALE GENITALIA (figs. 14,29). **Segment IX**: Lobes of tergite usually moundlike, small, widely separated, bearing a variable number of short to moderately long setae. **Sidepiece**: Roughly conical, length about 2.0 of basal width; tergal surface with longer bristles and a few basal scales, sternal side with shorter setae. **Lobe** postmedian in position, with distinct proximal and distal divisions; stem of proximal division distinct, bearing 2 rods apically; distal division with specialized apical setae, and with or without leaves on stem. **Clasper**: Comparatively simple, about 0.6 of sidepiece; distal 0.3 with many closely set spiculelike transverse ridges externally. **Phallosome**: Lateral plate of aedeagus with a broadly sclerotized "basal hook," a caudally directed apical process and a shorter sternal process. **Proctiger**: Basolateral sclerotization moderately developed, usually produced into a digitiform appendage below tergite IX; apex of paraproct with a crown of 6-13 teeth; cercal setae variable.

PUPAE (figs. 14,29). **Cephalothorax**: Middorsal ridge moderate. Integument uniformly lightly to moderately pigmented. All hairs present, variously developed. Hair 5-C short to moderately long, weakly developed, subequal in length to 4-C; hair 6-C smaller than and cephalad of 7-C; hair 7-C double or triple; 8,9-C widely separated, usually single, 8-C caudolaterad and 9-C caudad of trumpet base. **Trumpet**: Not placed on tubercle; moderately long, index 5.0-9.0; strongly pigmented; tracheoid distinct, short; apex not flared; pinna short. **Metanotum**: Hairs 10,11-C removed from 12-C, moderately close together; 10-C usually with fewer than 6 branches; 11-C usually single, rarely double. **Abdomen**: Without distinct pattern of pigmentation. Hair 3-I usually single; 1-II multiple, branches short and weak, not resembling float hair (1-I); hair 2-III-VII submarginal, situated either laterad or mesad of hair 1; hair 5-IV,V moderately long, single, usually extending to apex of succeeding segment; 5-VI moderately long, usually single, never extending beyond basal 0.6 of succeeding segment; 6-II-VI usually single, rarely double; 2-VI,VII laterad of hair 1; hair 9-II-VI caudolaterad of hair 6; hair 9-VII at least 3-branched, 9-VIII 4-branched and about 0.5 of segment length, both strongly developed; 4-VIII usually double; 1-IX small, single (absent in *restrictor*). Lobes on posterior margin of sternum VIII distinct. Tergite VIII slightly overlapping base of tergite IX. **Paddle**: Without any pigmented spot; longer than wide, apex rounded; midrib strongly differentiated; external buttress distinct; paddle margin without spicules; both paddle hairs (1,2-P) apparently not developed.

FOURTH INSTAR LARVAE (figs. 15,30). **Head**: Width about 1.2 of length. Head capsule with conspicuous lateral expansion on each side caudad of antenna. Labrum well differentiated dorsally. Ocular lobes slightly marked. Mouthbrushes with numerous filaments. Collar moderately developed, narrow. Posterior tentorial pit a short distance from caudal border. Maxillary suture complete, extending a

short distance caudolaterad of pit. Anterior border of labial plate truncate. Aulaeum with distinct filamentous spicules. Mental plate well developed, with 7-9 lateral teeth; median tooth usually shouldered. Hair 0-C small, removed laterad of 1-C; hair 1-C strong, straight; 2,3-C apparently both not developed; 4-C small, usually single and anteromesad of 5,6-C; hair 5-C multiple, longer than antenna; 6-C anterolaterad of 5-C, single and distinctly longer than antenna; 7-C multiple, with barbed branches; 8-C usually double, rarely triple; 11-C with 2-6 weak branches; 13-C slightly closer to 12-C than to 11-C; 14,15-C moved slightly anteriad; basal maxillary hair (*bmh*) small, single; 16,17-C not developed. **Antenna**: Moderately long, with distinct spinelike spicules in basal 0.75. Hair 1-A large, multiple and inserted 0.75 from base; other hairs short to moderately long, single. **Thorax**: Roughly oval in outline, slightly wider than long. Integument glabrous. Hairs 1-3-P on a distinct tubercle; 1-P long, single; 3-P moderately long, single to 5-branched; 14-P single; 0-P, 1,13,14-M, 1,3,13-T with weak branches, not stellate, *restrictor* with longer, stronger branches in 13-T. **Abdomen**: Integument glabrous. Hairs 1,2,4,11,13-I, 1,2,5,9,13-II, 1,2,5,7,9,13-III-VII short to moderately long, varied in branching, never stellate; hair 2 never moved far cephalad of 1, always within posterior half of segment; 6-I long, at least triple; 7-I long, single; 6-II long, double or triple; 7-II shorter, multiple; 6-III-V at least moderately long, double or triple; 6-VI single, long. **Segment VIII**: Comb scales in a patch of 3-5 irregular rows; individual scale narrow, elongate, broadly rounded apically. Hair 1-VIII multiple, with short weak branches; 5-VIII moderately long, double or triple; 1,2-VIII not on tubercle or sclerotized plate except in *restrictor*. **Siphon**: Long, index 13.0-30.0. Integument with minute wartlike spicules. Acus distinct, attached, with a short blunt ventral and a narrow pointed dorsal projection, except no dorsal projection in *restrictor*. Pecten not extending beyond basal 0.25. Hair 1-S distinctly caudad of last pecten tooth; 4-6 pairs of subventral (1,1a-S) and 2 pairs of subdorsal hairs (2a-S) on siphon; both subdorsal hairs distal in position; hair 2-S distinct, slightly curved, with or without submedian branch. **Anal Segment**: Saddle complete; integument imbricate and faintly spiculose distally; acus not developed; caudal margin without spines; hair 1-X short to moderately long, branched. Hairs 2, 3-X long, single; ventral brush (4-X) with 5 pairs (6 in *restrictor*) of branched hairs on a grid with distinct lateral bar, not attached to saddle; no detached proximal hairs. Gills varied in length, ventral shorter than or subequal to dorsal.

GENERAL CONSIDERATIONS

TAXONOMIC CHARACTERS. **Adults** of *Anoedioporpa,* like those of most other subgenera of *Culex,* are very similar in external morphology and ornamentation, and therefore we have not been able to find many reliable characters for the separation of the 2 groups. The problem becomes even more difficult at the specific level. The only reliable characters we found useful in the separation of groups are: (1) presence or absence of acrostichal bristles on the disc of the mesonotum and (2) length of male and female palpus. The characters used in the separation of species are rather tenuous, such as (1) coloration of scales on upper margin of *ppn* and antealar area above paratergite and (2) coloration of erect scales on vertex.

The **male genitalia**, however, show significant and reliable characters at the specific level such as: (1) nature of the lobes of IX tergite, (2) position and structure of subapical lobe, (3) details of clasper, (4) presence or absence of foliaceous setae on the subapical lobe, and (5) number and nature of cercal setae and apical spines on the paraproct.

Like the adults, the immature stages are difficult to diagnose at the specific level, but reliable characters are present to separate them into groups. In the **pupae**, the characters used at the level of groups are: (1) length of 10-C in relation to 11-C, (2) nature and branching of hair 1-II, (3) length of 6-I,II in relation to 7-I,II, and (4) presence or absence of hair 1-IX. The fourth instar **larvae** show many significant characters at the group and, sometimes, specific levels. Among the most important characters used in the separation of groups are: (1) nature of the central tooth of mental plate, (2) presence or absence of a sclerotized plate on segment VIII, (3) number of hairs in the ventral brush (4-X), and (4) number of subdorsal hairs (2a-S) on siphon.

SYSTEMATICS. The following combination of characters of the adults and immature stages will distinguish *Anoedioporpa* from other subgenera of *Culex*. In the **adults**, the subgenus is characterized by the combination of: (1) only narrow decumbent scales on the vertex, (2) short palpus in both sexes (except in *restrictor*), (3) general absence of acrostichal bristles on the mesonotum (except in *corrigani* and *restrictor*), (4) generally yellowish pleural integument, and (5) dark tarsi. In the **male genitalia**, *Anoedioporpa* is distinguished by: (1) shape and position of lobe of IX tergite, (2) development and structure of subapical lobe, (3) details of clasper, and (4) shape of the lateral plate of phallosome. In the **pupae**, the subgenus is diagnosed by: (1) strongly pigmented trumpet, (2) hair 9-VIII long, subequal in length to tergite VIII, (3) presence of hair 1-IX (absent in *restrictor*), (4) absence of marginal spicules on paddle, and (5) absence of both paddle hairs. The most important characters that separate *Anoedioporpa* from other subgenera in the **larvae** are: (1) absence of head hair 2-C (present in *restrictor* only), (2) shouldered central tooth on mental plate (simple in *restrictor*), (3) 4 pairs of subventral and 2 pairs of subdorsal hairs on the siphon, (4) apical hook (2-S) of siphon with a small submedian branch, (5) dorsal saddle hairs (2,3-X) long, single, and (6) ventral brush usually with 5 pairs of hairs (6 pairs in *restrictor*).

We are including in *Anoedioporpa Culex restrictor,* considered a member of the subgenus *Microculex* by Stone, Knight and Starcke (1959:250) and Knight and Stone (1977:269). On the basis of correlated features of adults and immatures, *restrictor* appears to be closer to *Anoedioporpa* than to other subgenera. However, *restrictor* is very distinct in certain features, and therefore it is placed in a monotypic group. It has retained several ancestral attributes not exhibited by members of the Conservator Group.

In the present revision 12 species are recognized in the subgenus, falling into 2 well defined groups: (1) **Conservator Group** with 11 species (*conservator, canaanensis, damascenoi, browni, bamborum, belemensis, chaguanco, originator, quasioriginator, luteopleurus* and *corrigani*) and (2) monotypic **Restrictor Group.**

BIONOMICS. All members of *Anoedioporpa* are container breeders, and their immature stages have been collected mainly in treeholes and/or bamboo, and occasionally in artificial containers. The adults of all species are primarily sylvan, but some have been collected in suburban surroundings at low to moderately high elevations. Field studies in Panama show that immature stages are found near ground level as well as in the forest canopy (Galindo, Carpenter and Trapido 1951), and apparently the adults do not show any preference for height. The females of *Anoedioporpa* are not reported to bite man and like most of the species of *Culex* are nocturnal. Some species exhibit positive phototropism and are collected in large numbers in light traps (Galindo and Blanton 1955). Females of *Culex conservator* lay their eggs in rafts on the surface of water in treeholes (Howard, Dyar and Knab 1915:310), but nothing is known about the ovipositing behavior of other species.

DISTRIBUTION (figs. 12,27). *Anoedioporpa* is primarily Central and South American in its distribution; apparently all species are confined to the mainland with the exception of *conservator* and *originator*. The subgenus has a wide distribution, extending from Mexico through Central America, Colombia, Venezuela, the Guianas, northern and eastern parts of Brazil, and northern Argentina. The northern limits of distribution are found in the states of Jalisco on the Pacific side and San Luis Potosi on the Atlantic side of Mexico (*restrictor*). The southern limits of distribution are found in the departments of Salta and Misiones in northern Argentina (*chaguanco*). On the Pacific side of the Andes in South America, *Anoedioporpa* extends south only a short distance to the department of Valle del Cauca in Colombia (*browni*). This subgenus has not been reported from central or southern Brazil, but this is probably due to paucity of collections. Further surveys from various critical areas in Brazil will probably reveal some hitherto unknown forms, and fill some of the lacunae in our present understanding of the distribution of the various species of *Anoedioporpa*.

Of all the known species of *Anoedioporpa, Culex conservator* appears to be the dominant and most widespread one in terms of range and number of individuals. It is sympatric with all the other species of the subgenus with the possible exception of *canaanensis* and *chaguanco*. It is the only species occupying almost the entire range of the distribution of *Anoedioporpa*. Four species (*browni, corrigani, originator, restrictor*) are known from numerous localities in Central and/or northern South America. Only 2 species are known from any of the islands of the West Indies: *conservator* from Trinidad and Tobago, and *originator* from Trinidad, Grenada and Martinique. All the remaining 7 species are each known from only one or 2 localities in South America.

KEYS TO SPECIES OF *ANOEDIOPORPA*

ADULTS

1. Mesonotum with at least a few acrostichal bristles 2
   Mesonotum with no indication of acrostichal bristles 3

2(1). Acrostichal bristles extending from anterior promontory to prescutellar area, strong, distinct; lower *mep* with a bristle . . . . ***12. restrictor***
   Acrostichal bristles represented by 3,4 shorter setae near prescutellar area; lower *mep* bare . . . . . ***11. corrigani***

3(1). Antealar area above paratergite with black scales . . . ***10. luteopleurus***
   Antealar area above paratergite with scattered white scales 4

4(3). Erect scales on vertex white to creamy . . . . . ***1. conservator***
   Erect scales on vertex brown to black 5

5(4). Scales on upper *ppn* brown . . . . . ***2. canaanensis; 8. originator***
   Scales on upper *ppn* white . . ***3. damascenoi; 4. browni; 5. bamborum; 6. belemensis; 7. chaguanco; 9. quasioriginator***

MALE GENITALIA

1. Inner surface of sidepiece below proximal division of subapical lobe with a large densely setose area 2
   Inner surface of sidepiece below proximal division of subapical lobe at most with a few scattered setae 6

2(1). Proximal division of subapical lobe densely setose on under surface to basal 0.5 in addition to a setose area on sidepiece . . ***2. canaanensis***
   Proximal division of subapical lobe not setose on under surface 3

3(2). Setose area of sidepiece below proximal division of subapical lobe flattened 4
   Setose area of sidepiece below proximal division of subapical lobe in the form of a swollen boss 5

4(3). Distal division of subapical lobe with 2 enlarged leaves near middle of stem . . . . . ***1. conservator***
   Distal division of subapical lobe with only 1 enlarged leaf near middle of stem . . . . . ***3. damascenoi***

5(3). Distal division of subapical lobe with a lanceolate seta midway on stem; setose area of sidepiece below proximal division (boss) without any enlarged setae . . . . . ***4. browni***
   Distal division of subapical lobe with an enlarged leaf midway on stem; setose area of sidepiece below proximal division (boss) with a few specialized enlarged setae . . . . . ***5. bamborum***

6(1). Proctiger with a densely setose subapical area 7
   Proctiger with a few very short, weak cercal setae 8

7(6). Stem of proximal division of subapical lobe with a patch of short setae extending from base to middle . . . . . ***8. originator***
   Stem of proximal division of subapical lobe without any setae . . . . . ***9. quasioriginator***

8(6). Distal division of subapical lobe short, wider than long, without a narrow stem 9
   Distal division of subapical lobe longer than wide, with a narrow stem . 10

9(8). Distal division of lobe with only specialized setae; cercal sclerite of proctiger broad, digitiform, bent mesad; clasper stout, about 0.5 length of sidepiece . . . . . ***11. corrigani***
   Distal division of lobe, in addition to specialized setae, with 4 apical leaves; cercal sclerite of proctiger digitiform, bent laterad; clasper narrow, slender, about 0.60-0.65 length of sidepiece . . . . . ***12. restrictor***

10(8). Distal division of subapical lobe with 5 enlarged leaves; ninth tergite lobes indistinct . . . . . ***10. luteopleurus***
   Distal division of subapical lobe with 1 or 2 enlarged leaves; ninth tergite lobes distinct, moundlike 11

11(10). Distal division of subapical lobe with 1 enlarged leaf midway on stem . . . . . ***7. chaguanco***
   Distal division of subapical lobe with 2 enlarged leaves midway on stem . . . . . ***6. belemensis***

PUPAE

(*6. **belemensis**, 9. **quasioriginator*** and *10. **luteopleurus*** unknown; *2. **canaanensis*** not included)

Restrictor Group

1. Hair 10-C strongly developed, double, longer than 11-C . . *12. **restrictor***
Hair 10-C weakly developed, multiple, shorter than or subequal to 11-C . 2

Conservator Group

2(1). Hair 1-VII at least double; 4-VI usually cephalomesad of 5-VI . . . . . *11. **corrigani***
Hair 1-VII single; 4-VI cephalolaterad of 5-VI 3

3(2). Hair 2-II extremely small, branches indistinct at 100X 4
Hair 2-II small, branches distinct at 100X 5

4(3). Apex of paddle slightly produced; trumpet moderately long, index about 8.0-9.0 . . . . . *5. **bamborum***
Apex of paddle rounded; trumpet shorter, index less than 7.0 . . . . . *3. **damascenoi***

5(3). Hair 5-III at least triple (4-7) . . . . . *1. **conservator***
Hair 5-III single or double 6

6(5). Hair 1-VI usually double . . . . . *7. **chaguanco***
Hair 1-VI single . . . . . *4. **browni**; 8. **originator***

LARVAE

(*3. **damascenoi**, 6. **belemensis**, 9. **quasioriginator*** and *10. **luteopleurus*** unknown; *2. **canaanensis*** not included)

Restrictor Group

1. Ventral brush (4-X) with 6 pairs of hairs; central tooth of mental plate not shouldered; hair 2-VIII on an oval sclerotized plate . . . *12. **restrictor***
Ventral brush (4-X) with 5 pairs of hairs; central tooth of mental plate shouldered; hair 2-VIII not on a sclerotized plate 2

Conservator Group

2(1). Hair 1-V short, branched, barely extending to apex of segment . . . . . *11. **corrigani***
Hair 1-V extremely long, single, extending beyond apex of succeeding segment 3

3(2). Siphon extremely long, index more than 25.0 . . . . . *5. **bamborum***
Siphon shorter, index less than 20.0 4

4(3). Gills long, dorsal at least 2.0 length of saddle . . . . . *4. **browni***
Gills shorter, dorsal subequal to length of saddle 5

5(4). Siphon with 5 paris of subventral hairs (1,1a-S) . . . . . *7. **chaguanco***
Siphon with 4 pairs of subventral hairs (1,1a-S) 6

6(5). Hair 5-C usually triple (2-5); hair 3-P single or double; 7-P usually double, rarely single . . . . . *1. conservator*
Hair 5-C at least 4-branched (4-7); hair 3-P usually triple (2-5); hair 7-P usually single, rarely double . . . . . *8. originator*

Conservator Group

FEMALES. Usually small, inornate species. **Head**: Erect scales forked apically, creamy to brown. Proboscis longer than forefemur, entirely dark scaled. Palpus short, about 0.15 length of proboscis, 4-segmented, segment 4 about 2.0 of segment 3. Antenna shorter than proboscis. **Thorax**: Mesonotal scales tan to brown. Acrostichal bristles usually absent (2,3 short setae present near prescutellar space in *corrigani*). Pleural integument yellowish to greenish; scaling restricted to upper *ppn* and *stp*; lower *mep* usually with 1 strong bristle. **Abdomen**: Tergites II-VII with basolateral light patches, predominantly dark scaled; sternites predominantly creamy, dark scaled distally.

MALES. Similar to female in coloration. Palpus short, about 0.15 length of proboscis, 4-segmented; segment 4 about 1.6 of segment 3.

MALE GENITALIA. **Segment IX**: Tergite lobe moundlike or indistinct, with varied number of short to moderately long setae. **Sidepiece**: Roughly conical, length 1.8-2.0 of greatest width. **Lobe** situated at 0.7, directed caudomesad, divided into proximal and distal divisions; proximal division with 2 distinct rods; distal division with varied number of setae; leaf present or absent on stem. **Clasper**: About 0.6-0.7 length of sidepiece, curved inwards, distal portion usually with transverse ridges on external margin. **Phallosome**: Lateral plate with apical process broadly rounded or truncate from dorsal aspect; sternal spine short, pointed. **Proctiger**: Paraproct with 6-13 apical teeth; cercal setae variable in number.

PUPAE. **Cephalothorax**: Hair 5-C short, weakly developed, subequal in length to 4-C; hair 10-C weakly developed, at least double, distinctly shorter than 11-C. **Abdomen**: Hair 1-II small, weakly branched, not resembling float hair (1-I); hair 1-III-VII moderately long, varied in branching; 6-I,II moderately long, subequal to 7-II,III; hair 5-IV,V long, single, either barely reaching or extending beyond apex of succeeding segment; 2-II-VI short, subequal in length to 9-II-VI; hair 9-VII strong, at least 2-branched (2-5); hair 9-VIII with 3-8 strong branches, slightly shorter than segment VIII; hair 1-IX present, small. Posterior margin of sternum VIII mesad of hair 9-VIII distinctly lobed. **Paddle**: Elongate, lightly pigmented; hairs 1,2-P absent.

FOURTH INSTAR LARVAE. **Head**: Hair 5-C at least 3-branched; 6-C single; 7-C with 6-10 and 11-C with 3,4 branches. Central tooth of mental plate distinctly shouldered. **Antenna**: Hair 1-A inserted about 0.75 from base. **Thorax**: Hairs 5,6-P single, 7-P single or double, all strongly developed. **Abdomen**: Hair 6-III-V moderately long, but less than 0.5 length of 6-I,II; hair 9-II-VI short, single and spinelike. **Segment VIII**: Hair 2-VIII not on a sclerotized plate. **Siphon**: Subventral hairs (1, 1a-S) 4,5 pairs; subdorsal hairs (2a-S) only 2 pairs, both located in distal half of siphon. **Anal Segment**: Ventral brush (4-X) with 5 pairs of hairs on a grid. Gills varied in length, ventral usually shorter than dorsal.

DISCUSSION. The Conservator Group includes all members of the subgenus except *restrictor,* and is strongly differentiated from the Restrictor Group in the adults and immature stages. In the adults, both sexes have a short palpus, and are devoid of acrostichal bristles on the disc with the exception of *corrigani.* The pupae are readily

recognized by the weakly developed hair 10-C which is distinctly smaller than or subequal to 11-C. The larvae are immediately separated from all others by the presence of a shouldered central tooth on the mental plate and 5 pairs of hairs in the ventral brush.

Of all the included species, *conservator* appears to be the dominant species with an extensive distribution from southern Mexico through Central America to central (Anapolis, Goias) and eastern (Alagoas) Brazil, including the islands of Trinidad and Tobago. *Culex originator* has a more restricted distribution in northern South America (Venezuela, the Guianas, NE Brazil), and is the only other species known from Trinidad; it is the only species reported from any of the islands of the Lesser Antilles (Grenada and Martinique). *Culex corrigani* is found only in Central America, along the Caribbean side from Nicaragua to Panama, and on the Pacific side in Panama. *Culex browni* is known from eastern Panama (Darien) to the Pacific side of the Andes in Colombia (Valle del Cauca) and the Atlantic side of the Andes in Ecuador (Napo); *browni* is the only species reported from the Pacific side of the Andes in South America, and the only species reported from Ecuador. *Culex belemensis* and *damascenoi* are both known only from 2 localities each in French Guiana and northeastern Brazil. *Culex chaguanco* is the most southern species, being known from 2 localities in Argentina (Salta and Misiones). The other 4 species are known only from their type localities: *bamborum* from Colombia (Meta), *canaanensis* from Brazil (Espirito Santo), and *luteopleurus* and *quasioriginator* both from the state of Para in Brazil.

1. Culex (Anoedioporpa) conservator Dyar & Knab

Figs. 12,13,14,15

1906. *Culex conservator* Dyar & Knab 1906:221-222. *TYPE: *Lectotype* larval skin (13.12) with associated pupal skin and male, St. Joseph (St. George), Trinidad, 15 June 1905, A. Busck [USNM; designation of Stone and Knight 1957:46].

1906. *Culex divisior* Dyar & Knab 1906:222-223. *TYPE: *Lectotype* larval skin (B15-6) with associated pupal skin and male, Trinidad, 9 Nov 1905, F.W. Urich [USNM; designation of Stone and Knight 1957:47-48]. Synonymy with *conservator* by Dyar 1922:95.

1922. *Culex (Isostomyia) bifoliata* Dyar 1922a:94-96. *TYPE: *Lectotype* male (164.4) with genitalia slide, Miraflores, Canal Zone, Panama, 15 Dec 1921, J.B. Shropshire [USNM, 25 254; designation of Stone and Knight 1957:44]. Synonymy with *conservator* by Dyar 1928:345.

1923. *Culex paganus* Evans 1923a:104-106. *TYPE: *Lectotype* male (D/409) with genitalia on 3 slides, from village, Estado Aragua, Venezuela, 2 Aug 1922, M. Nunez Tovar [BM-LIVER; designation of Belkin 1968b:18-19]. NEW SYNONYMY.

Culex (Anoedioporpa) conservator of Bonne and Bonne-Wepster (1925:188,260,261-263); Belkin (1968b:11-12); Bertram (1971:745,751); Xavier and Mattos (1975:246); Knight and Stone (1977:195); Heinemann and Belkin (1977a:283; 1977b:415,427,442; 1977c:528; 1978a:183, 194; 1978b:393,437; 1979:94).

Culex (Isostomyia) conservator of Dyar (1918:103; 1922:95,96); Gordon and Evans (1922:325, 326,327); Edwards (1932:218); Komp (1936:327); Chagas, da Cunha et al. (1938:194); Lane (1939:73-74); Anduze (1941:16; 1943:196; 1947:359); Lane and Whitman (1943:397,398); Rozeboom and Komp (1948:430); Arnett (1948:189-190; 1950:107,111,112); Galindo, Carpenter and Trapido (1951:102,104,105,107,108,110,111,112,113,126); Horsfall (1955:548).

Culex (Aedinus) conservator of Dyar (1923b:189); Bonne-Wepster and Bonne (1923:125); Stone, Knight and Starcke (1959:281, in part); Belkin, Schick and Heinemann (1965:70); Cova Garcia, Sutil and Rausseo (1966a:28,107, in part; 1966b:40-41, 83-84, 342, in part).

Culex (Melanoconion) conservator of Dyar (1928:345-346); Lima (1930:255); Shannon (1931:8, 23); Komp (1935:10); Chagas, da Cunha et al. (1937:385,387,388,389).

Culex (Tinolestes) conservator of Lane (1953:391-392); Duret and Damasceno (1955:394,395); Galindo and Blanton (1955:70); Fauran (1961b:48); Cerqueira (1961:131).
Culex (Anoedioporpa) bifoliatus of Dyar (1923a:177); Bonne and Bonne-Wepster (1925:260,263).
Culex (Isostomyia) bifoliata of Gordon and Evans (1922:327); Evans (1923:105,106); Stone and Knight (1957:44).
Culex (Aedinus) bifoliatus of Dyar (1923b:189).
Culex (Melanoconion) bifoliatus of Dyar (1925:158,161,169).
Culex (Anoedioporpa) paganus of Bonne and Bonne-Wepster (1925:260,265); Belkin (1968:12,18, 19); Xavier and Mattos (1975:246).
Culex (Isostomyia) paganus of Lane and Whitman (1943:397).
Culex (Aedinus) paganus of Stone, Knight and Starcke (1959:282); Belkin, Schick and Heinemann (1965:75); Cova Garcia, Sutil and Rausseo (1966a:28; 1966b:41,84,343).
Culex (Tinolestes) paganus of Lane (1953:394-395); Duret and Damasceno (1955:394,395,397, 407,408); Fauran (1961b:48).
Culex conservator of Dyar (1906:18); Urich (1913:529); Howard, Dyar and Knab (1915:222,229, 308-310); Soper, Penna et al. (1933:574); Kumm and Novis (1937:511); Kumm, Komp and Ruiz (1940:403); Galindo, Carpenter and Trapido (1955:159-161); Stone and Knight (1957: 46); Mattos and Xavier (1965:281); Forattini, Rabello and Cotrim (1970:37).
Culex paganus of Forattini, Rabello and Cotrim (1970:468).

FEMALE (fig. 13). Wing: 2.4-2.5 mm. Proboscis: 1.8-1.9 mm. Forefemur: 1.5-1.7 mm. Abdomen: 1.60-1.65 mm. As described for the subgenus and group, with the following additional features. **Head**: Decumbent scales on vertex narrow, creamy; sides and venter with broad white scales. Erect scales white to creamy. Palpus short, about 0.16 length of proboscis. **Thorax**: Scales on mesonotum predominantly narrow, auburn except for white scales on anterior promontory and along anterior part of lateral prescutal area. Antealar area above paratergite with moderately broad white scales. Pleural integument usually yellowish. Upper margin of *ppn* with narrow white scales. Lower *mep* with a strong bristle. **Abdomen**: Scales on tergites predominantly brown except for basolateral light areas. Sternites with creamy to whitish scales.

FEMALE GENITALIA (fig. 13). As described and figured for Conservator Group.

MALE (fig. 13). Wing: 2.4-2.5 mm. Proboscis: 2.0 mm. Forefemur: 1.6 mm. Similar to female in general coloration. Palpus about 0.15 length of proboscis.

MALE GENITALIA (fig. 14). As figured; diagnostic characters as in the key. **Segment IX**: Tergite lobes slight, widely separated, each with 4-6 short weak setae. **Sidepiece**: Roughly conical; length about 2.0 of greatest width; lateral surface with a few longer bristles and scales; sternal surface with shorter setae; tergal surface laterad of proximal division of subapical lobe with a triangular, densely setose area. **Lobe**: Proximal division with a moderately long stem bearing 2 rods with hooked tips, upper rod inserted at apex, lower slightly basad. Distal division distinct, with 1 subbasal (sometimes basal) and 1 submedian leaf on stem; apex with a long filament with recurved expanded tip on upper surface, 2 broad filaments with expanded apexes on upper angle, between these a shorter lanceolate seta. **Clasper**: About 0.60-0.65 length of sidepiece, sharply bent mesad at distal 0.4; distal 0.3 of outer surface with many closely set transverse ridges; 1 submedian and 1 subapical seta on inner surface. **Lateral Plate**: Basal hook sclerotized, strongly curved, bearing a few denticles; apical process distinct, moderately long and expanded widely at tip; sternal spine short, pointed. **Proctiger**: Apex of cercal sclerite narrow, digitiform, directed caudomesad; cercal setae 1 or 2. Paraproct with a row of 6,7 blunt apical teeth.

PUPA (fig. 14). Abdomen: 2.3-2.5 mm. Trumpet: 0.35-0.40 mm; index about 5.0-5.5. Paddle: 0.50-0.55 mm. As figured; diagnostic characters as in the key.

Cephalothorax: Integument lightly pigmented, wing case slightly darker. Hairs 1,3-C single; 2-C usually double (2,3); hairs 4,5,7-C double; 6-C single; 8,9-C single; 10-C at least 3-branched (3-6). **Trumpet**: Very strongly pigmented and distinctly contrasting with cephalothorax. **Abdomen**: Integument lightly pigmented. Hair 1-II short, weakly branched, easily distinguishable at 100X; hair 7-II single; 4-VI short, weakly branched, cephalolaterad of 5-VI; hair 1-VI,VII usually single; 9-VII with 4,5 branches; 9-VIII usually 6-branched (3-7). **Paddle**: Lightly pigmented, longer than wide, about 2.0 of segment VIII. Male genital lobe extending to 0.4 and female to 0.25 of paddle.

FOURTH INSTAR LARVA (fig. 15). Head: 0.80-0.85 mm. Siphon: 1.6-1.7 mm; index 15.0-18.0. Anal Saddle: 0.3 mm. As figured; diagnostic characters as in key. **Head**: Width about 1.2 of length. Hair 4-C usually single; 5-C usually with 3 branches (2-5); hair 9-C usually with 6 branches (4-8); hair 14-C single; 15-C usually with 3 branches (3,4), short, not extending to base of mental plate. Mental plate with a strong medium shouldered tooth and 6,7 distinct teeth on either side. **Antenna**: Length about 0.5 of head, distinctly spiculose to hair 1-A; all hairs single except 1-A (20,16-24). **Thorax**: Hair 0-P short, weak, with dendritic branches; 1-3-P long, single; 4-P double; 5-7-P single; 14-P small, single; 4-M double. **Abdomen**: Hairs 3,6-I usually with 3 branches (3,4); 7-I single; 6-II moderately long, usually triple; 6-III-V shorter than segment length, double; 1-V long, single. **Segment VIII**: Comb scales in a patch of 4,5 irregular rows, about 53-57 in number; individual scale with spatulate fringed apex. **Siphon**: Integument moderately pigmented, with a darker basal ring. Subventral hairs (1,1a-S) 4 pairs, progressively smaller distad; subdorsal hairs (2a-S) 2 pairs, short, located in distal third of siphon. Pecten extending barely to proximal 0.25; individual tooth long, pointed apically, without lateral denticles. **Anal Segment**: Integument moderately pigmented, slightly imbricate. Hair 1-X short, weakly branched; 2,3-X long, single. Gills short; dorsal 0.65-0.90 length of saddle; ventral slightly shorter than dorsal.

SYSTEMATICS. *Culex conservator,* the type species of *Anoedioporpa,* can be distinguished from other members of the subgenus in the **adults** by the presence of white to creamy erect scales on vertex; in the **male genitalia** by the combination of: (1) presence of a subbasal and a submedian leaf on distial division of subapical lobe and (2) large, triangular, densely setose area on the inner surface of sidepiece below subapical lobe; in the **pupa** by the combination of: (1) hair 1-VII single, (2) shorter trumpet with index of 5.0-5.5, and (3) 5-III at least triple (3-7); in the **larva** by the combination of: (1) hair 5-C usually triple (2-5), (2) hair 3-P single or double, and (3) hair 7-P usually double, rarely single.

Culex conservator is the most abundant and widespread species of *Anoedioporpa* and constitutes the dominant species of the subgenus in terms of range and number of individuals. It is sympatric with all species except *canaanensis* and *chaguanco.* This dominance indicates that *conservator* may possibly be one of the more modern species of *Anoedioporpa* in relation to the complex distribution pattern and geological history of the area occupied by this species. However, it may represent the ancestral stock from which several segregates have developed in the Conservator Group.

Very little variation in adult morphology is apparent throughout the known wide distribution of *conservator,* and no significant population differentiation in the immature stages has been detected in the relatively large sample examined.

We have examined the types of *divisior* Dyar & Knab 1906 and *bifoliata* Dyar 1922, and they are undoubtedly conspecific with *conservator*; hence their synonymy (Dyar 1922:95; 1928:345) is justified. We are synonymizing *paganus* Evans 1923

with *conservator.* Although we have not studied the types in detail, the description of *paganus* matches in all pertinent details the diagnostic features of *conservator.* On the other hand, *surukumensis* Anduze 1941 which has been synonymized with *conservator* in the past appears to be conspecific with *originator* (see).

BIONOMICS. The immature stages of *Culex conservator* have been found in tree-holes and bamboo in sylvan areas. They are frequently found breeding in open tree-holes in suburban areas away from forests. This species is particularly addicted to bamboo traps and was found almost equally as often in traps situated near the ground as in the forest canopy (Galindo, Carpenter and Trapido 1951:127). Apparently the eggs are laid in a raft floating on the surface of the water (Howard, Dyar and Knab 1915:310). The females are innocuous and do not bite humans (Shannon 1931:23).

DISTRIBUTION (fig. 12). *Culex conservator* is the most widely distributed species in the subgenus, extending from southern Mexico (Tabasco) to at least northern Brazil (Amazonas, Para). It is reported to occur as far south as central (Anapolis in Goias) and eastern (Alagoas, Ceara, Piaui) Brazil. It is found throughout Central America (all countries except El Salvador and Nicaragua), in the islands of Trinidad and Tobago, and in parts of northern South America, including the Guianas, Colombia (Meta) and Venezuela (Aragua, Carabobo, Monagas). It has been collected from near sea level to 740 m above sea level.

Material examined: 1636 specimens; 236 males, 207 females, 315 pupae, 878 larvae; 227 individual rearings (142 larval, 62 pupal, 23 incomplete).

BELIZE. **Cayo**: Augustine, Mountain Pine Ridge, 500-1000 m, 10 Aug 1967, P. Williams, 1M (BH 490) [UCLA].

BRAZIL. **Alagoas**: Maceio (Chagas, da Cunha et al. 1937:388). **Amazonas**: Rio Paruary, det. J. Lane [FH, 5933-35]. Maues, Mgen, det. J. Lane [FH, 6123; Forattini, Rabello and Cotrim 1970: 37]. **Ceara**: Crato (Chagas, da Cunha et al. 1937:387). **Goias**: Anapolis (Mattos and Xavier 1965: 281). **Para**: Belem, Conceicao do Araguaia; and Utinga (as *paganus*) [INER, Xavier and Mattos 1975:246]. Curralinho, Rio Camucu, 1936, H.W. Kumm, 1M (K74) [USNM] ; Rio Massaranduba [INER, Xavier and Mattos 1975:246]. Ilha de Marajo (Kumm and Novis 1938:511). **Piaui**: Teresina (Thorezina) (Chagas, da Cunha et al. 1937:385). **Locality unspecified**: H.W. Kumm, 1Mgen (9043) [USNM].

COLOMBIA. **Meta**: Villavicencio, 1944, M. Bates, 3M (CV 61,61-1,61-8), 1F (61-1); Bosque Ocoa, 19 Aug 1948, M. Bates, 1Mgen (CV 1009-101) [UCLA].

COSTA RICA. **Puntarenas**: Golfito, H.W. Kumm, 1Mgen (509) [USNM]. Osa Peninsula, Rincon, near sea level, 29 June 1963, C.L. Hogue, 1 lpM (CR 130-201), 3 lpF (131-203,-205,-206), 3 pM (130-601-603), 3M, 7F, 9P, 83L (130), 2 lpM (CR 131-201,-204), 5M, 8F, 12P, 168L (131), 1 M (CR 138) [UCLA].

FRENCH GUIANA. **Guyane**: Organabo, 10 m, 16 Feb 1969, J. Clastrier, 2L (FGC 3914) [UCLA].

GUATEMALA. **Izabal**: Quirigua ruins, 70 m, 4 Aug 1964, T. and J. Zavortink and W. Almengor, 1 lpM (GUA 90-101), 1 lpF (90-100) [UCLA].

HONDURAS. **Atlantida**: Lancetilla, 50 m, 19 Aug 1964, A. Quinonez, 1 lpF (HON 54-20), 2 pF (54-101,-203), 2P (54), 2 pM (HON 55-100,-101), 2 pF (55-102,-103), 2P, 2L (55) [UCLA].

MEXICO. **Tabasco**: Comalcalco, 10 m, 12 July 1970, K. and D. Schroeder, 1 lP (MEX 553-10), 1 pM (MEX 554-101), 2 pF (554-100,-102), 12L (554), 1 lpF (MEX 555-20), 6L (555) [UCLA].

PANAMA. **Bocas del Toro**: Almirante, 10 m, 27 Apr 1963, A. Quinonez, 1 lpF (PA 259-104), 4L (259); 14,15 Apr 64, A. Quinonez, 1M (PA 666) [UCLA]. **Canal Zone**: Arraijan, 9 Oct 1950, S.J. Carpenter, 2L; 20 Nov 1950, S.J. Carpenter, 8L; 30 Oct 1950, S.J. Carpenter, 1L [UCLA]. Balboa, 28 Dec 1921, J.B. Shropshire, 2F [USNM] ; 18 Feb 1943, 4F (KO 37-3) [UCLA]. Barro Colorado Is., 25-170 m, 7 May 1943, W.H.W. Komp, 1M (KO 37-23), 3F (KO 37-18, 37-30, 41-43); 12 May 1943, 1M (KO 41-12); 31 May 1943, 1F (KO 37-31); 20 Aug 1944, K. Frick, 3M (ASM 80-1, 90-1); 15 May 1945, 6L (52-89, 53-11); 26 July 1946, 1M, 1F (KO 31-32); 4 Dec 1965, A.

Quinonez, 1 lpM (PA 861-12), 1 lpF (861-30) [UCLA]; Miller Tower area, 15 May 1945, 1M, 1F [USNM]; Pearson Trail, 7 May 1943, 1M (KO 41-17), 2F (KO 41-26,-39); S.M. Trail, 7 May 1943, 1F (KO 41-37) [UCLA]. Chiva Chiva, 30 m, 10 Nov 1965, A. Quinonez, 3 lpM (PA 764-10-12), 2 lpF (764-13,-14), 2 pF (764-100,-101), 1P (764); 11 Nov 1965, A. Quinonez, 1 lpM (PA 768-30), 1F (768), 4 lpM (PA 769-11,-13,-15,-16), 3 lpF (769-10,-12,-14), 1F, 1P, 17L (769) [UCLA]. Chepo Road, 22 Oct 1939, 6M [USNM]. Corozal, 26 Apr 1942, 4M, 4F; Corozal Lab, 30 Aug 1943, 2M, 3F; Corozal Road, East, 27 Apr 1942, 3M, 2F [USNM]. Fort Sherman, 26 Aug 1949, 1 lpF (918-12); 10 Feb 1950, 1 lpF (2645-2); 24 Feb 1950, 1 lpF (2755-7); 26 Oct 1950, S.J. Carpenter, 16L; Sweet Water Reservoir, 80 m, 10 Nov 1964, A. Quinonez, 1 lpF (PA 732-20), 4L (732) [UCLA]. Gatun, 25 Aug 1926, D.P. Curry, 2M, 2F; 25 July 1928, 2L [USNM]. Madden Forest Preserve, less than 200 m, 29 Nov 1965, 2 lpM (PA 839-11,-15), 3 lpF (839-10,-12,-13), 1 lP (839-14), 5L (839) [UCLA]. Mandingo, 22 Dec 1921, J.B. Shropshire, 2M (25284), 1F [type series of ***bifoliata***, USNM]. Margarita, 10 m, 8 Oct 1964, A. Quinonez, 1 pM (PA 716) [UCLA]. Miraflores, 28 Dec 1921, J.B. Shropshire, 1F [USNM]. Mojinga Swamp, 29 June 1922, 1Mgen; 2 Mgen [USNM]; 5 m, 13 Oct 1964, A. Quinonez, 1 pM (PA 724-100) [UCLA]. Nuevo Emperador, road near, 100 m, 23 Nov 1965, A. Quinonez, 2 lpM (PA 832-10,-11A), 1M, 1P (832) [UCLA]. Old Gaillard Hwy, 31 Oct 1941, 1M; 14 Sept 1941, 1F; 1 Sept 1941, 1M, 2F [USNM]. Summit, 25 May 1945, 1L [USNM]. Venado Beach, 21 Oct 1939, 7L [USNM]. Locality unspecified, 31 Dec 1921, J.B. Shropshire, 2M [USNM]. **Colon**: Corredor de Colon, near sea level, 24 Sept 1964, A. Quinonez, 11L (PA 713) [UCLA]. **Darien**: Rio Chucunaque, 16 Feb 1958, GML, 4M (GG 1-146); mouth of Rio Tuquesa, 10 m, 17 Feb 1958, GML, 4M, 2F (GG 1-156) [UCLA]. El Real, Piriaque, near sea level, 13 Jan 1964, A. Quinonez, 2L (PA 622) [UCLA]. Jaque, Rio Jaque, near sea level, 19 Dec 1963, A. Quinonez, 1 lpM (PA 612-107), 2 pF (612-119), 1 lP (612-118), 128L (612) [UCLA]. Morti, Morti Hydro, 100 m, 29 Nov 1966, O.G.W. Berlin, 1 pM (PA 958-100) [UCLA]. Paya Camp, 50 m, 3 July 1958, GML, 1 pF (GG 1-115) [UCLA]. Santa Fe, 20 m, 10 Dec 1966, O.G.W. Berlin and M. Mena, 1 pM (PA 997-101) [UCLA]. Tacaracuna, El Salto, 9 Sept 1958, GML, 1 lpM (GG 118-103), 1 lpF (118-101); Rio Tacarcuna valley, 600 m, 5 July 1963, A. Quinonez, 2 lpF (PA 437-101,-103), 1 pF (437-102), 1L (437) [UCLA]. Rio Tuira, mouth of Rio Paya, 50 m, 3 Mar 1958, GML, 2M (GG 68) [UCLA]. **Panama**: El Libano, near sea level, 26 Nov 1963, A. Quinonez, 5 lpM (PA 567-110,-115,-117,-119,-120), 4 lpF (567-112,-116,-121,-124), 22L [UCLA]. Juan Mina, 40 m, 18 Jan 1963, A. Quinonez, 2 lpF (PA 8-101,-102), 1L (8) [UCLA]. La Chorrera, 17 Oct 1944, Adams, 4M, 2F, 6L (ASM 210-2) [UCLA]. Panama Viejo, 17 Nov 1944, R. Arnett and K. Frick, 1F (ASM 290-1) [UCLA]. Pacora, 27 July 1950, S.J. Carpenter, 1 L; 29 Aug 1950, S.J. Carpenter, 5L [UCLA]. **Locality unspecified**: 2 Nov 1934, L.E. Rozeboom, 1L [USNM]. **No data**: 1M (KO H-13-12), 4L (KO 5-366,-402,-411) [UCLA]; M, det. Galindo [FH, 9012; Forattini, Rabello and Cotrim 1970:37].

SURINAME. **Locality unspecified**: J. Bonne-Wepster, 2M (BB 310,2a), 2F (BB 311,2e) [USNM].

TOBAGO. **St. George**: Caledonia, 290 m, 17 Nov 1965, T.H.G. Aitken, R. Martinez and A. Guerra, 1 lP (TOB 39-20), 1 lpM (TOB 42-32), 1 lpF (42-31), 5L (42) [UCLA]. **St. Patrick**: Buccoo, 25 m, 19 Nov 1965, R. Martinez and A. Guerra, 7L (TOB 61) [UCLA]. Scarborough, Orange Hill, 150 m, 27-28 Nov 1965, R. Martinez and A. Guerra, 1M (TOB 126); 30 Nov 1965, R. Martinez and A. Guerra, 1 lpM (TOB 138-12), 2 lpF (138-10,-11), 1 pF (138-101), 1 lpF (TOB 139-10), 2P, 4L (139) [UCLA]. **Locality unspecified**: July 1905, A. Busck, 1M (690723-2) [USNM].

TRINIDAD. **Nariva**: Archers Estate, 50 m, 5 Nov 1964, A. Guerra, 1 lpM (TR 812-113) [UCLA]. Nariva Swamp, Bush Bush Forest, near sea level, 26 Feb 1964, TRVL, 1L (TR 100) [UCLA]. Tabaquite, Charuma Forest, 50-150 m, 27 Aug 1964, A. Guerra, 2 pM (TR 637-108,-109), 2L (637); 8 Oct 1964, A. Guerra, 3L (TR 752) [UCLA]. **St. Andrew**: Cumaca, 200 m, 15 May 1964, A. Guerra, 1L (TR 407-127) [UCLA]. Vega de Oropouche, Esperanza Estate, 11 Nov 1960, 1M [USNM]. **St. George**: Aripo Valley, 150 m, 25 Feb 1965, F. Powdhar, 3L (TR 1015) [UCLA]. Monos Island, 50 m, 17 May 1964, R.L. Manuel, 1 lpM (TR 410-103), 2 lpF (410-108,-109), 2 pM (410-184,-200), 1 pF (410-185), 6L (410) [UCLA]. Piarco, Centeno Propagating Station, 10 m, 21 Jan 1965, A. Guerra, 1 pM (TR 958-130), 8L (958) [UCLA]. St. Joseph, 15 June 1905, A. Busck, 1 lpF (13-3), 5M (13-1,-5,-6,-7,-10), 2Mgen (13-2,-7) [type series, USNM]; 3M (34-2), 2M, 1F [USNM]; La Baja Rd., 30 m, 9 Sept 1965, A. Guerra, 1 lpM (TR 1390-10), 1 lpF (1390-11),

1pM (1390-100) [UCLA]. Verdant Vale, 300 m, 11 Mar 1965, A. Guerra, 8L (TR 1037); 200 m, 29 Jan 1966, A. Guerra, 4L (TR 1448) [UCLA]. U.S. Naval Base, males, det. Heredia [FH, 10926-29; Forattini, Rabello and Cotrim 1970:37]. **Locality unspecified**: 9 Nov 1905, F. Urich, 1 lpM (B15-3), 1 pM (B15-10), 3M (B15-1,-7,-8), 4F (B15-2,-4,-5,-9), 1F [type series of *divisior,* USNM].

VENEZUELA. **Aragua**: Cata, near sea level, 15 Aug 1969, J. Pulido, 2 pM (VZ 353-103,-104), 5 pF (353-100-102,-105,-106), 1M, 1P, 5L (353), 1 lpM (VZ 354-10), 3L (354); 21 Aug 1969, J. Clavijo and J. Valencia, 15L (VZ 388) [UCLA]. Choroni, Natl. Rt. 2 between Maracay and Choroni, 550 m, 15 Aug 1969, J. Valencia, 2 lpF (VZ 358-20,-21), 3L (358) [UCLA]. Guamitas, 740 m, 15 July 1969, J. Bergland and T. Zavortink, 2 lpF (VZ 203-90,-91) [UCLA]. Maracay, M, F [FH, 8936-37; Forattini, Rabello and Cotrim 1970:37]; 13 Sept 1926, M. Nunez Tovar, 2M; 10 Oct 1926, M. Nunez Tovar, 1M, 2F; 13 Oct 1926, M. Nunez Tovar, 5F; 14 Nov 1926, M. Nunez Tovar, 8M, 5F; 3 Dec 1926, M. Nunez Tovar, 5M, 6F; M. Nunez Tovar, 1M [USNM]; L.E. Rozeboom, 9M, 6F (VZR 256); 6 June 1967, 1F [UCLA]. Maracay, San Jacinto, 9 Sept 1928, L.E. Rozeboom, 1M (VZR 64); 450 m, 17 July 1969, J. Pulido and J. Valencia, 1 lpM (VZ 238-10), 1 pM (238-100), 2P, 4L (238), 1 lpM (VZ 239-12), 2 lpF (239-10,-15), 2 pM (239-101,-102), 1 pF (239-100), 3 lP (239-11,-13,-16), 8M, 2F, 13P, 9L (239), 3 lpM (VZ 240-11,-12,-14), 2 lpF (240-15,-16), 1 pM (240-101), 1 pF (240-100), 3 lP (240-10,-13,-17), 3M, 3F, 9P, 29L (240) [UCLA]. Maracay, Natl. Rt. 2 between Maracay and Choroni, 900 m, 26 July 1969, J. Pulido and J. Valencia, 1 pF (VZ 269-100); 20 km N of Maracay on Natl. Rt. 2, 800 m, 6 Aug 1969, J. Valencia, 1 lpF (VZ 315-30) [UCLA]. Ocumare de la Costa, 10 m, 10 July 1969, J. Valencia and T. Zavortink, 4L (VZ 132) [UCLA]. Ocumare de la Costa, MAC Cacao Dispersion Center, 100 m, 10 July 1969, J. Bergland, J. Pulido, J. Valencia and T. Zavortink, 3 lpM (VZ 139-15-17), 5 lpF (139-10-14), 2 lP (139-18,-19), 1M, 4F, 4P, 10L (139); 12 July 1969, J. Pulido and J. Valencia, 1 lpM (VZ 177-30), 1 lpF (177-31), 1 lpM (VZ 179-21), 2 lp (179-20,-22), 2P, 4L (179), 2 lpM (VZ 180-20, -23), 2 lpF (180-21,-24), 1 pF (180-100), 1 lp (180-22), 1L (180), 1 lpF (VZ 184-20); 5 Aug 1969, J. Valencia, 1 pM (VZ 306-103), 1 pF (306-104), 3L (306), 3 pF (VZ 308-100-102), 1P, 6L (308) [UCLA]. Ocumare de la Costa, Rio Cumboto, 60 m, 28 July 1969, J. Pulido and J. Valencia, 1L (VZ 275), 1 pM (VZ 277-100) [UCLA]. Puerto Ocumare, near sea level, 10 July 1969, J. Bergland and T. Zavortink, 2 lpM (VZ 133-20,-21), 1L (133) [UCLA]. Rancho Grande, 14 km NW of of Natl. Rt. 3, 500 m, 12 July 1969, J. Pulido and J. Valencia, 1 lpM (VZ 187-14), 1 lpF (187-13), 1L (187), 1 lpM (VZ 189-12), 1 lpF (189-11), 1 lP (189-10), 2P, 7L (189), 3 lpM (VZ 190-11,-13, -14), 2 lpF (190-15,-16), 1 pM (190-100), 1 lP (190-10), 3 lpM (VZ 193-13,-15,-16), 5 lpF (193-10,-11,-14,-17,-21), 1 pM (193-100), 13P, 16L (193) [UCLA]. Rancho Grande, 16 km NW of on Natl. Rt. 3, 400 m, 5 Aug 1969, J. Valencia, 1 lpF (VZ 305-10), 4 pM (305-100-102,-104), 1 pF (305-103), 1 lp (305-30), 2M, 1F, 2P, 22L (305) [UCLA]. Turiamo, Sept 1944, 1M (VZK 31) [UCLA]. **Carabobo**: Borburata, 5 m, 24 July 1969, J. Pulido and J. Valencia, 4 lpM (VZ 264-10, -12-14), 2 lpF (264-11,-15), 1 pF (264-100), 2M, 1F, 4P, 7L (264) [UCLA]. Guigue, 500 m, 24 July 1969, J. Pulido and J. Valencia, 1F, 1P (VZ 266), 1 pF (VZ 267-100) [UCLA]. Mariara, 420-450 m, 19 July 1969, J. Pulido and J. Valencia, 3 lpM (VZ 246-10,-11,-17), 5 lpF (246-12-16), 2F, 2P, 2L (246), 1 lpF (VZ 247-10), 3L (247) [UCLA]. San Joaquin, 420 m, 19 July 1969, J. Pulido and J. Valencia, 1 lpM (VZ 249-10), 2 lpF (249-11,-14), 1 pM (249-102), 1 pF (249-101), 5 lP (249-12,-13,-15-17), 1P, 6L (249) [UCLA]. **Monagas**: Quiriquire, June 1935, 1Mgen [USNM].

NO DATA. 28 Dec 1933, J. Diaz, 1Mgen; 1L [USNM].

2. Culex (Anoedioporpa) canaanensis Lane & Whitman

Figs. 12,26

1943. *Culex (Isostomyia) canaanensis* Lane & Whitman 1943:398-400. TYPE: *Holotype* male (2692), Sao Joao de Petropolis, Vale do Canaa, Espirito Santo, Brazil, Apr or July 1940, L. Whitman [CPRR].

Culex (Anoedioporpa) canaanensis of Belkin (1968b:12); Belkin, Schick and Heinemann (1971: 27); Xavier (1973:160); Knight and Stone (1977:195).

Culex (Isostomyia) canaanensis of Rozeboom and Komp (1948:400).

Culex (Aedinus) canaanensis of Stone, Knight and Starcke (1959:281); Stone (1967:218).

Culex (Tinolestes) canaanensis of Lane (1953:396-398); Duret and Damasceno (1955:394,395).
Culex canaanensis of Forattini, Rabello and Cotrim (1970:37).

FEMALE. Not seen; description based on Lane and Whitman (1943:398-400). Similar to *conservator,* differing in the following. **Head:** Decumbent scales on vertex predominantly whitish. Palpus about 2.0 length of clypeus. **Thorax:** Mesonotal scales dark brown. Pleural integument blackish and greenish. Scales on upper margin of *ppn* brown.

MALE. Not seen. Similar to female in coloration. Palpus about 2.0 length of clypeus.

MALE GENITALIA (fig. 26). Not seen; description and figure based on Lane and Whitman (1943:398-400). As figured; diagnostic characters as in key. **Segment IX:** Tergite lobes small, moundlike, each with 6-10 short setae; interlobar space wide. **Sidepiece:** Roughly triangular in outline; length about 2.0 greatest width; tergal surface with longer bristles; sternal surface with shorter setae; tergal surface laterad of subapical lobe with a densely setose area. **Lobe:** Proximal division with a distinct stem, setose on under surface to basal 0.5 and bearing 2 rods with hooked tips, upper rod inserted at apex, lower slightly basad. Distal division distinct, with 1 large striated submedian leaf and 1 smaller subapical leaf; apex with 4,5 short setae. **Clasper:** About 0.55 length of sidepiece, smoothly curved; 1 submedian and 1 subapical seta on inner surface. **Lateral plate** probably as in rest of Conservator Group. **Proctiger:** Paraproct with 6,7 blunt apical teeth.

PUPA. Not seen; description based on Lane (1953:397). **Cephalothorax:** Integument lightly pigmented. All hairs short. **Trumpet:** Strongly sclerotized, index about 6.0. **Abdomen:** Integument lightly pigmented. Hair 1-II very small, weakly branched, distinguishable at 100X; hair 5-III moderately long, extending to middle of succeeding segment; 5-IV,V long, extending to apex of succeeding segment; 5-VI barely extending to apex of succeeding segment; 9-VII,VIII with 3-5 short branches. **Paddle:** Elongate, longer than wide, more than 2.0 of segment VIII.

FOURTH INSTAR LARVA. Not seen; description based on Lane and Whitman (1943:400) and Lane (1953:397-398). **Head:** Width slightly greater than length. Hair 4-C single; 5-C with 3 branches; 9-C with 4 branches. **Antenna:** Length about 0.5 of head, spiculose to hair 1-A; all hairs single except 1-A. **Thorax:** Hairs 1,2-P single; 3-P double; 4-P double. **Segment VIII:** Comb scales in a patch of several rows. **Siphon:** Long, index about 15.0. Integument strongly pigmented. Subventral hairs (1,1a-S) apparently 4 pairs; subdorsal hairs (2a-S) 2 pairs. Pecten barely extending to proximal 0.2; individual tooth spinelike. **Anal Segment:** Integument strongly pigmented. Hair 1-X small, weakly branched; 2,3-X long, single. Gills short; ventral apparently shorter than dorsal.

SYSTEMATICS. *Culex canaanensis* is distinguished from other members of the subgenus in the **male genitalia** by the combination of: (1) proximal division of subapical lobe setose on under surface to basal 0.5, (2) tergal surface of sidepiece laterad of subapical lobe with a densely setose area, and (3) distal division with 2 leaves midway on stem. Although the immature stages have been described (Lane and Whitman 1943:398-400; Lane 1953:396-398), their structural details are poorly known. We have not seen any material of *canaanensis,* but it appears to be closely related to *conservator.*

The holotype of *canaanensis,* whose location has been unknown in the past, is now in the collection at the "Centro de Pesquisas Rene Rachou" [CPRR], Instituto de Endemias Rurais, Fundacao Instituto Oswaldo Cruz, Belo Horizonte, Minas Gerais, Brazil (Xavier 1973:160).

DISTRIBUTION (fig. 12). *Culex canaanensis* is known only from the type locality in Espiritu Santo, southeastern Brazil.

Material examined: none.

BRAZIL. **Espirito Santo**: Sao Joao de Petropolis, Vale do Canaa, Apr or July 1940, L. Whitman, holotype male (2692) [CPRR] ; Vale do Canaa, male paratype [FH, 3843]. Data from original description and Forattini, Rabello and Cotrim (1970:37).

3. Culex (Anoedioporpa) damascenoi Duret

Figs. 12,26

1969. *Culex (Anoedioporpa) damascenoi* Duret 1969:143-145. TYPE: *Holotype* male, Rio Preto, Municipio de Joao Goulard, Amazonas, Brazil, 18 July 1964, J.P. Duret [Duret].

1971. *Culex (Aedinus) menui* Clastrier 1971:649-653. TYPE: *Holotype* male with pupal skin ([FGC] 3612-30), Maripasoula, Inini, French Guiana, 24 Aug 1968, J. Clastrier [MNHP]. NEW SYNONYMY.

Culex (Anoedioporpa) damascenoi of Stone (1970:164); Belkin, Schick and Heinemann (1971:27); Knight and Stone (1977:196); Heinemann and Belkin (1978b:437).

Culex (Aedinus) menui of Fauran and Pajot (1974:102).

FEMALE. Unknown.

MALE. Not seen; description based on Duret (1969:143-145). As described for the subgenus with the following additional features. **Head**: Palpus short, approximately 3.0 length of clypeus. Decumbent scales on vertex narrow, grayish. Erect scales forked, dark brown. **Thorax**: Mesonotal integument chestnut gray. Pleural coloration mostly yellowish. Haltere with a pale stem; scales on knob dark. **Abdomen**: Tergites with dark scales; sternites creamy.

MALE GENITALIA (fig. 26). Not seen; figure and description based on Duret (1969:143-145). As figured; diagnostic characters as in key. **Segment IX**: Tergite lobes indistinct, each with 4,5 fine setae; interlobar space wide. **Sidepiece**: Roughly conical; length about 2.0 greatest width; basotergal and lateral surfaces with scattered long bristles; sternal surface with shorter setae; tergal surface laterad of proximal division with a large densely setose area. **Lobe**: Proximal division with a moderately long stem bearing 2 rods with hooked tip, upper rod inserted at apex, lower slightly basad. Distal division with 1 large subbasal leaf on stem; apex with a long filament with recurved expanded tip on upper surface, 3 broad filaments with expanded apexes on upper angle, between these a shorter lanceolate seta. **Clasper**: About 0.65-0.70 length of sidepiece, slightly bent mesad at distal 0.4; distal 0.3 of outer surface with many closely set spiculelike transverse ridges; 1 submedian and 1 subapical seta on inner surface. **Lateral Plate**: Basal hook sclerotized, strongly curved, bearing a few scattered denticles; apical process long, expanded distally; sternal spine short, pointed. **Proctiger**: Paraproct with a row of 6,7 blunt apical teeth.

PUPA. Not seen; description based on that of *menui* by Clastrier (1971:651-653). Abdomen: 1.7-1.8 mm. Trumpet: 0.35 mm; index about 6.5-7.0. Paddle: 0.4 mm. **Cephalothorax**: Integument lightly pigmented, wing case slightly darker. Hairs 1,3-C single; 2-C double; 4,5-C double; 8,9-C single; 10-C triple. **Trumpet**: Strongly pigmented and distinctly contrasting with cephalothorax. **Abdomen**: Integument moderately pigmented, progressively lighter caudad. Hair 1-II extremely small, branched; 4-VI short, double, cephalolaterad of 5-VI; hair 1-VI,VII single; 9-VIII with 5 branches. **Paddle**: Lightly pigmented, longer than wide, about 2.0 of segment VIII. Male genital lobe extending to 0.6 of paddle.

LARVA. Unknown.

SYSTEMATICS. *Culex damascenoi* is known only by the holotype male. In the **male genitalia** it is distinguished from other members of the subgenus by the combination of: (1) tergal surface of sidepiece laterad of subapical lobe with a large densely setose area and (2) distal division of subapical lobe with only 1 enlarged leaf near middle of stem. We have not seen the type of *damascenoi,* but from the description and illustration it appears to be distinct, although closely related to *conservator.*

We are also synonymizing *Culex menui,* described by Clastrier (1971:649-653), with *damascenoi.* Although we have not seen the type material of *menui,* it is evident that this species from French Guiana is conspecific with *Culex damascenoi* from Brazil, as the original description of *menui* obviously matches in all pertinent details the diagnostic characters of *damascenoi. Culex menui* is described from the holotype male with the associated pupal skin. The pupal features of *damascenoi,* therefore, are based on the description of *menui* Clastrier 1971.

BIONOMICS. The immature stages of *damascenoi* are found in treeholes. Nothing is known about the behavior of the females.

DISTRIBUTION (fig. 12). *Culex damascenoi* is presently known only from the state of Amazonas in Brazil and the territory of Inini in French Guiana.

Material examined: none.

BRAZIL. **Amazonas**: Rio Preto, Municipio de Joao Goulard, male [Duret; holotype of *damascenoi*].

FRENCH GUIANA. **Inini**: Maripasoula, track to Wacapou near airfield, 100 m, 24 Aug 1968, J. Clastrier, male (FGC 3612-30) [MNHP, holotype of *menui*]; Inini Experiment Station, adult (Fauran and Pajot 1974:102).

4. Culex (Anoedioporpa) browni Komp

Figs. 12,16,17

1936. *Culex (Isostomyia) browni* Komp 1936:326-328. *TYPE: *Holotype* male with genitalia, Gatun, Canal Zone, Panama, 29 Nov 1933, C.G. Brown [USNM].

Culex (Anoedioporpa) browni of Belkin (1968b:12); Knight and Stone (1977:195); Heinemann and Belkin (1978a:183; 1978c:523).

Culex (Anoedioporpa) sp undetermined of Heinemann and Belkin (1979:107).

Culex browni of Galindo, Carpenter and Trapido (1955:159).

Culex (Isostomyia) browni of Lane (1939:73); Rozeboom and Komp (1948:403); Galindo, Carpenter and Trapido (1951:102,104,105,108,110,111,126); Stone and Knight (1957:58).

Culex (Aedinus) browni of Stone, Knight and Starcke (1959:281); Belkin, Schick and Heinemann (1965:55-56).

Culex (Tinolestes) browni of Lane (1953:395-396); Duret and Damasceno (1955:395,400,404); Galindo and Blanton (1955:70).

FEMALE. Wing: 2.9 mm. Proboscis: 2.1 mm. Forefemur: 1.75-1.80 mm. Abdomen: about 2.2 mm. Essentially similar to *conservator,* differing in the following. **Head**: Decumbent scales on vertex predominantly white, a few median ones brownish. Erect scales on occiput brown. Palpus about 0.15 length of proboscis. **Thorax**: Scales on mesonotum predominantly brown, except for light scales on anterior promontory and along anterior part of lateral prescutal area. Pleural integument yellowish to faintly green. Scales on upper margin of *ppn* white; antealar area above paratergite with white scales; lower *mep* with a bristle.

MALE. Wing: 2.9 mm. Proboscis: 2.25 mm. Forefemur: 1.8 mm. Similar to female in general coloration. Palpus about 0.15 length of proboscis.

MALE GENITALIA (fig. 16). As figured; diagnostic characters as in key. **Segment IX**: Tergite lobes small, moundlike, each with 7,8 short, fine subbasal setae;

interlobar space wide. **Sidepiece**: Roughly conical; length about 2.0 of greatest width; lateral surface with longer bristles and a few scales; sternal surface predominantly with shorter setae, long bristles restricted to apical half; tergal surface basad of lobe with a densely setose, swelling boss; scattered short setae basad of boss. **Lobe**: Proximal division with a moderately long stem; with enlarged apex bearing 2 rods with hooked tip, upper rod inserted at apex, lower slightly basad. Distal division distinct, with a short lanceolate seta midway on stem; 4 subapical lanceolate setae on lower surface; apex with a long filament with a recurved expanded tip on upper surface, a pointed leaf and a lanceolate filament on upper angle, between these 2 short foliaceous setae with pointed apexes. **Clasper**: About 0.65-0.70 length of sidepeice, strongly curved at middle; distal 0.4 of outer surface with many closely set spiculelike transverse ridges; 2 subapical setae on inner surface. **Lateral Plate**: Basal hook sclerotized, strongly curved, bearing a few scattered denticles; apical process distinct, moderately long, expanded at tip; sternal spine short, pointing laterad. **Proctiger**: Cercal sclerite broad basally, apex hooked and pointing basad; cercal setae absent. Paraproct with a row of 6,7 blunt apical teeth.

PUPA (fig. 16). Abdomen: 2.0-2.2 mm. Trumpet: 0.38-0.43 mm; index about 5.5-6.5. Paddle: 0.55-0.60 mm. As figured; diagnostic characters as in key. **Cephalothorax**: Integument lightly pigmented. Hairs 1,3-C single; 2-C double; 4-C double; 5-C usually triple; 6-C single; 7-C double; 8,9-C always single; 10-C at least 3-branched (3-5). **Trumpet**: Very strongly pigmented and strongly contrasting with cephalothorax. **Abdomen**: Integument lightly pigmented. Hair 1-II short, weakly branched, readily distinguishable at 100X; hair 7-II usually single; 4-VI short, weakly branched, cephalolaterad of 5-VI; hair 1-VI,VII single; 9-VII usually 5-branched (3-5); hair 9-VIII usually 6-branched (4-7). **Paddle**: Lightly pigmented, longer than wide, about 2.0 of segment VIII. Male genital lobe extending to 0.50 and female to 0.25 of paddle.

FOURTH INSTAR LARVA (fig. 17). Head: 0.90-0.95 mm. Siphon: 2.0-2.1 mm; index 13.0-14.0. Anal Saddle: 0.4 mm. As figured; diagnostic characters as in key. **Head**: Width subequal to length. Hair 4-C usually single (1,2); hair 5-C usually with 5 branches (4-6); hair 9-C usually with 6 branches (5-8); hair 14-C single; 15-C usually double (2,3), short, not extending to base of mental plate. Mental plate with a strong median shouldered tooth and 8,9 distinct teeth on either side. **Antenna**: Length about 0.5 of head, distinctly spiculose to hair 1-A; all hairs single except 1-A (13,12-14). **Thorax**: Hair 0-P short, weak, with dendritic branches; 1,2-P long, single; 3-P moderately long, about 0.4 of 1-P, usually triple (2-4); hair 4-P usually double (2,3); hairs 5,6-P long, single; 7-P usually double (1-3); hair 14-P small, single; 4-M double or triple. **Abdomen**: Hair 3-I double or triple; 6-I with 4 branches (3,4); hair 7-I single; 6-II long, longer than segment, usually triple (2-4); hair 6-III-V longer than segment, double; 1-V long, single. **Segment VIII**: Comb scales in a patch of 3,4 irregular rows, about 39-50 in number; individual scale with fringed apex. **Siphon**: Integument lightly pigmented, darker basally and with a narrow dark basal ring. Subventral hairs (1,1a-S) 4 pairs, proximal 2 pairs long and single, distal 2 small and branched; subdorsal hairs (2a-S) 2 pairs, short, located in distal 0.2 of siphon. Pecten extending barely to proximal 0.2; individual tooth long, pointed apically, with a subbasal denticle ventrally. **Anal Segment**: Integument moderately pigmented, slightly imbricate. Hair 1-X short, weakly branched; 2,3-X long, single. Gills long; dorsal 2.0-2.5 length of saddle; ventral shorter, subequal to length of saddle.

SYSTEMATICS. *Culex browni* can be distinguished from other members of the Conservator Group by the combination of the following: in the **male genitalia** by

(1) densely setose area on tergal surface of sidepiece basad of subapical lobe in form of a swelling boss and (2) a lanceolate seta midway on stem of distal division of subapical lobe; in the **pupa** by (1) hair 1-VI,VII single and (2) hair 5-III single or double; in the **larva** by (1) hair 1-V long, single and (2) gills long, dorsal pair about 2.0-2.5 length of saddle.

The record of *browni* from Ecuador is somewhat doubtful, since it is based only on 2 larvae collected in Napo Province (Amazon drainage). However, the larval features agree very well with those of the type population from Panama.

BIONOMICS. The immature stages of *browni* have been collected in bamboo, treeholes and occasionally artificial containers including bamboo pots. They are found in bamboo traps near ground level and in the forest canopy (Galindo, Carpenter and Trapido 1951:126-127). Females of *browni* are not known to bite man, and males are only occasionally found in light trap collections (Galindo and Blanton 1955:70).

DISTRIBUTION (fig. 12). *Culex browni* is known to occur in Panama (Canal Zone, Darien), Colombia (Caribbean, Pacific and Orinoco drainages) and Ecuador (Amazon drainage). It is the only species of *Anoedioporpa* known from the Pacific side of the Andes in South America, being found as far south as the department of Valle del Cauca in Colombia. It has been collected from near sea level to about 600 m above sea level.

Material examined: 234 specimens; 34 males, 24 females, 71 pupae, 105 larvae; 66 individual rearings (39 larval, 17 pupal, 10 incomplete).

COLOMBIA. **Antioquia**: Zaragoza, 22 km W, 18 Dec 1970, C.H. Porter, 1 pM (COP 193-10) [UCLA]. **Meta**: Villavicencio, Bosque Ocoa, Apiary Rd., 23 Apr 1948, 1 lp (CV 571-2) [UCLA]. **Valle del Cauca**: Buenaventura, Rio Raposo, R.F. Virus Field Station, 30-40 m, 9 Dec 1964, V.H. Lee, 1 lpF (COL 35-16), 8L (35); 13 Jan 1965, V.H. Lee, 1 lpM (COL 36-10), 1 lpF (36-11), 4 lpM (COL 37-12-15), 3 lpF (37-10,-18,-19), 1 pM (37-100), 2 lP (37-11,-17), 4L (37), 3 lpM (COL 40-20,-22,-23), 1 lpF (40-21), 1 lP (40-24); 27 Jan 1965, V.H. Lee, 1 pM (COL 45-100), 2 lpM (COL 48-10,-11); near mouth of Rio Raposo, less than 10 m, 23 Feb 1965, V.H. Lee, 1M, 1P (COL 56); Rio Raposo, R. F. Virus Field Station, 30-40 m, 19 Jan 1966, V.H. Lee, 1 lpM (COL 146-22), 2 pM (146-100,-102), 2 pF (146-101,-103), 2 pM (COL 147-103,-104), 3 pF (147-100-102), 2 lpM (COL 148-10,-14), 4 lpF (148-11,-12,-15,-16), 1L (148); 23 Mar 1966, V.H. Lee, 1 lP (COL 149-12), 15L (149), 3 lpM (COL 150-13-15), 1 lpF (150-11), 1 lp (150-16), 2 pM (150-101,-102), 2 lP (150-10,-12), 1M (150-100), 17L (150), 1 lpF (COL 151-12), 1 pF (151-100) [UCLA].

ECUADOR. **Napo**: Cuyabeno, about 50 km W of, Tarapoa, 300 m, 26 May 1974, D.J. Pletsch, 2L (ECU 212) [UCLA].

PANAMA. **Canal Zone**: Gatun, 29 Nov 1933, C.G. Brown, M [USNM, holotype]. **Darien**: Morti, Morti Hydro, 80 m, 7 Dec 1966, O.G.W. Berlin and R. Hinds, 1 pF (PA 989-100) [UCLA]. Rio Tacarcuna valley, 600 m, 14 June 1963, A. Quinonez, 6 lpM (PA 387-103,-107,-108,-111,-114,-116), 6 lpF (387-106,-109,-110,-112,-113,-115), 3 lp (387-101,-102,-104), 7L (387); 24 June 1963, A. Quinonez, 2 p (PA 420-103,-105) [UCLA]. **Province not specified**: Cerro Sete, 2 Apr 1946, P. Galindo, 1M, 1F [USNM]. Santa Clara, La Venta, 9 Apr 1943, 1F [USNM].

5. Culex (Anoedioporpa) bamborum Rozeboom & Komp

Figs. 12,18,19

1948. *Culex (Isostomyia) bamborum* Rozeboom & Komp 1948:399-400. *TYPE: *Holotype* male with associated pupal and larval skins and genitalia ([CV] 404), Acacias, Meta, Colombia, 3 June 1947, L.E. Rozeboom [USNM].

Culex (Anoedioporpa) bamborum of Belkin (1968b:12); Knight and Stone (1977:195).

Culex (Aedinus) bamborum of Stone, Knight and Starcke (1959:281); Belkin, Schick and Heinemann (1965:10).

Culex (Isostomyia) bamborum of Stone and Knight (1957:58).
Culex (Tinolestes) bamborum of Lane (1953:399-400); Rozeboom and Komp (1955:395,400,407).

FEMALE. Wing: 2.4 mm. Proboscis: 1.7 mm. Forefemur: 1.5 mm. Abdomen: about 1.6 mm. Essentially similar to *conservator,* differing in the following. **Head:** Decumbent scales on vertex white. Erect scales on occiput light brown. Palpus about 0.13-0.14 length of proboscis. **Thorax:** Scales on mesonotum predominantly brown, except for light ones on anterior promontory and along anterior part of lateral prescutal area. Pleural integument smoky bluish gray. Scales on *ppn* white; antealar area above paratergite with white scales; lower *mep* with a single bristle.

MALE. Wing: 2.4 mm. Proboscis: 1.8 mm. Forefemur: 1.5 mm. Similar to female in general coloration. Palpus about 0.14 length of proboscis.

MALE GENITALIA (fig. 18). As figured; diagnostic characters as in key. **Segment IX:** Tergite lobes small, moundlike, each bearing 6-8 fine subbasal setae; interlobar space wide. **Sidepiece:** Roughly conical; length about 2.0-2.3 of greatest width; lateral surface with long bristles; sternal surface with shorter setae. **Lobe:** Distinct swollen boss proximad of subapical lobe, clothed with fine setae in prominent tubercles, and with 2-4 specialized, enlarged, foliaceous setae near upper angle. Proximal division with a moderately long stem bearing 2 rods with hooked tips, upper rod inserted at apex, lower slightly basad. Distal division with 1 submedian enlarged leaf and 4 subapical broad filaments; apex with a long filament with a recurved expanded tip on upper surface, a slender leaf on upper angle, between these a lanceolate seta and a pointed seta. **Clasper:** About 0.50-0.55 length of sidepiece, distal half strongly curved mesad; distal 0.3 of outer surface with many closely set spicule-like transverse ridges; 1 submedian and 1 subapical seta on inner surface. **Lateral Plate:** Basal hook sclerotized, strongly curved, bearing a few scattered denticles; apical process moderately long, expanded apically and truncate; sternal spine short, pointed mesad. **Proctiger:** Cercal sclerite long, attenuated distally, digitiform, and with a smaller subbasal pointed sternal process; usually one cercal seta. Paraproct with a row of 9-12 blunt apical teeth and a few fine hairs.

PUPA (fig. 18). Abdomen: 2.2-2.5 mm. Trumpet: 0.45-0.50 mm; index about 8.0-9.0. Paddle: 0.5-0.6 mm. As figured; diagnostic characters as in key. **Cephalothorax:** Integument moderately pigmented, wing case slightly darker. Hairs 1,3-C single; 2-C double; 4,5-C double; 6-C single; 7-C double; 8,9-C single; 10-C usually 2-4-branched. **Trumpet:** Very strongly pigmented and strongly contrasting with cephalothorax. **Abdomen:** Integument moderately pigmented, progressively lighter caudad. Hair 1-II extremely small, rarely visible at 100X; hair 7-II usually single, rarely double; 4-VI short, weakly branched, cephalolaterad of 5-VI; hair 1-VI,VII single; 9-VII at least 4-branched (4-6); hair 9-VIII with 6 branches. **Paddle:** Lightly pigmented, longer than wide, about 2.0 of sigment VIII. Male genital lobe extending to 0.4-0.5 and female to 0.3 of paddle.

FOURTH INSTAR LARVA (fig. 19). Head: 0.8 mm. Siphon: 1.5-2.1 mm; index 25.0-27.0. Anal Saddle: 0.25 mm. As figured; diagnostic characters as in key. **Head:** Width about 1.1 of length. Hair 4-C usually single; 5-C usually with 4 branches (4,5); hair 9-C usually with 5 weak branches (5,6); hair 14-C single; 15-C single or double, short, not extending to base of mental plate. Mental plate with a strong median shouldered tooth and 8,9 distinct teeth on either side. **Antenna:** Length about 0.5 of head, distinctly spiculose to hair 1-A; all hairs single except 1-A (15,12-18). **Thorax:** Hair 0-P short, weak, with dendritic branches; 1,2-P long, single; 3-P moderately long, about 0.5 of 1-P, double; 4-P long, double; 5,6-P single; 7-P double; 14-P small, single; 4-M double. **Abdomen:** Hair 3-I triple; 6-I usually with 3,4 branches;

7-I single; 6-II long, triple; 6-III-V moderately long, subequal to or slightly longer than segment; 1-V long, single. **Segment VIII:** Comb scales in a patch of 3,4 irregular rows, about 64-69 in number; individual scale slightly spatulate, with fringed apex. **Siphon:** Integument lightly pigmented, darker basally and with a narrow dark basal ring. Subventral hairs (1,1a-S) 4 pairs, distal ones small; subdorsal hairs (2a-S) 2 pairs, located in distal 0.2 of siphon. Pecten extending barely to proximal 0.16; individual tooth long, pointed apically, without lateral denticles. **Anal Segment:** Integument moderately to strongly pigmented, lightly imbricate. Hair 1-X short, weakly branched; 2,3-X long, single. Gills variable, usually long; dorsal 1.5-2.0 length of saddle; ventral subequal to length of saddle.

SYSTEMATICS. *Culex bamborum* can be distinguished from all other species of *Anoedioporpa* in the **male genitalia** by the combination of: (1) setose area on sidepiece in form of a swollen boss proximad of subapical lobe, (2) 2-4 specialized, enlarged, foliaceous setae on boss, and (3) enlarged leaf midway on stem of distal division of lobe; in the **pupa** by (1) hair 1-II extremely small, rarely visible at 100X and (2) moderately long trumpet with an index of about 8.0-9.0; and in the **larva** by extremely long siphon with index more than 25.0.

BIONOMICS. The immature stages of *bamborum* have been collected only in uncut bamboo internodes perforated by holes bored by insects. Little is known about the behavior of females.

DISTRIBUTION (fig. 12). *Culex bamborum* is presently known only from the department of Meta (Orinoco drainage) in Colombia at moderate elevations (about 400-500 m).

Material examined: 38 specimens; 9 males, 4 females, 7 pupae, 11 larvae; 6 individual rearings (2 larval, 4 incomplete).

COLOMBIA. **Meta:** Acacias, 3 June 1947, L.E. Rozeboom, 1 lpM ([CV] 404-1), 1 lpF ([CV] 404-7) [USNM, type series]. Villavicencio area, 1944, M. Bates, 2p, 1M, 1F (CV 65-1), 2 l (65-1A), 1M, 2F (65), 1 lM (CV 73-1) [UCLA]. Villavicencio, Bosque Ocoa, 22 July 1948, 1Mgen (CV 589-105), 3 lp (CV 590-1,-3,-4); 19 Aug 1948, M. Bates, 3L (CV 1008) [UCLA]. Villavicencio, Bosque San Jose, 16 June 1944, M. Bates, 2M (CV 102) [UCLA]. Villavicencio, San Martin Rd., Chichimene, 11 Aug 1947, 1Mgen (CV 468-2), 1Mgen (CV 469-6) [UCLA].

6. *Culex (Anoedioporpa) belemensis* Duret & Damasceno

Figs. 12,26

1955. *Culex (Tinolestes) belemensis* Duret & Damasceno 1955:404-407. TYPE: *Holotype* male, Belem, Para, Brazil, 19 Aug 1953, R.G. Damasceno and J.P. Duret [Duret].

Culex (Anoedioporpa) belemensis of Belkin (1968b:12); Belkin, Schick and Heinemann (1971:27); Xavier and Mattos (1975:245); Knight and Stone (1977:195).

Culex (Aedinus) belemensis of Stone, Knight and Starcke (1959:281); Fauran and Pajot (1974: 102).

Culex (Tinolestes) belemensis of Fauran (1961b:48).

FEMALE. Unknown, but presumably similar to male in general features.

MALE. Not seen; description based on Duret and Damasceno (1955:404-407). Essentially similar to *conservator,* differing in the following. **Head:** Decumbent scales on head grayish white. Erect scales on occiput brown. Palpus about 2.0 length of clypeus. **Thorax:** Mesonotal scales brown. Pleural integument greenish yellow. Scales on upper margin of *ppn* brown.

MALE GENITALIA (fig. 26). Not seen; description and figure based on Duret and Damasceno (1955:406-407). Diagnostic characters as in key. **Segment IX:** Tergite lobes distinct, moundlike, each with 8-12 submedian setae; interlobar space wide.

Sidepiece: Roughly oval in outline; length about 1.5 of greatest width; tergal surface of sidepiece caudad of lobe with scattered short setae. **Lobe**: Proximal division with a moderately long stem bearing 2 rods with hooked tip, upper rod inserted at apex, lower slightly basad. Distal division distinct, with 1 submedian and 1 subapical leaf; apex with a long filament with recurved tip and a short seta on upper surface, 3 broad filaments on upper angle, between these a moderately long lanceolate seta. **Clasper**: About 0.65 length of sidepiece, smoothly curved mesad; distal 0.3 of outer surface with many closely set spiculelike transverse ridges; 2 subapical setae on inner surface. **Lateral Plate**: Basal hook sclerotized, strongly curved; apical process moderately long, expanded at tip; sternal spine short, slightly hooked. **Proctiger**: Cercal setae indistinct. Paraproct with 8,9 blunt apical teeth.

PUPA, LARVA. Unknown.

SYSTEMATICS. *Culex belemensis* is known only by the holotype male. In the **male genitalia**, *belemensis* is readily separated from all other members of the subgenus by the combination of: (1) absence of a densely setose area on the sidepiece proximad of subapical lobe, (2) 2 distinct leaves on stem of distal divison of lobe, and (3) moundlike IX tergite lobes. We have not seen the type, but from the original description it appears to be distinct although closely related to *conservator*.

BIONOMICS. The immature stages of *belemensis* are unknown, but like other members of the subgenus they should be found in treeholes and/or bamboo. The holotype male was presumably taken in a sweeping collection from a tree trunk. Nothing is known about the behavior of females.

DISTRIBUTION (fig. 12). *Culex belemensis* is known only from Belem, Para, Brazil at low elevations and the interior of French Guiana.

Material examined: none.

BRAZIL. **Para**: Belem, 19 Aug 1953, R.G. Damasceno and J.P. Duret, 1M (Br.15,E.10) [Duret, holotype].

FRENCH GUIANA. **Inini**: Experiment station (Fauran and Pajot 1974:102).

7. *Culex (Anoedioporpa) chaguanco* Casal, Garcia & Fernandez

Figs. 12,20,21

1968. *Culex (Aedinus) chaguanco* Casal, Garcia & Fernandez 1968:217-218. TYPE: *Holotype* male (GA[=ARG] 616-16) with associated larval and pupal skins and genitalia slide, 7 km from Tablillas, nearest town Vespucio, Dep. San Martin, Salta, Argentina, 25 Feb 1967, O.H. Casal and M. Garcia [INM].

Culex (Anoedioporpa) chaguanco of Stone (1970:164); Knight and Stone (1977:195).

FEMALE. Wing: 3.3 mm. Proboscis: 2.2 mm. Forefemur: 2.1 mm. Abdomen: about 2.2 mm. Similar to *conservator,* differing in the following. **Head**: Decumbent scales on vertex mainly white, median ones brown. Erect scales on occiput dark brown. Palpus about 0.16 length of proboscis. **Thorax**: Scales on mesonotum predominantly brown except for light scales on anterior promontory and anterior part of lateral prescutal area. Pleural integument yellowish greenish. Scales on upper margin of *ppn* brown. Antealar area above paratergite with white scales; lower *mep* with a bristle.

MALE. Wing: 3.3 mm. Proboscis: 2.3 mm. Forefemur: 2.1 mm. Essentially similar to female in coloration. Palpus about 0.16 length of proboscis.

MALE GENITALIA (fig. 20). As figured; diagnostic characters as in key. **Segment IX**: Tergite lobes distinct, moundlike, each with 4,5 subapical setae. **Sidepiece**: Roughly conical; length about 2.0 of greatest width; lateral surface with mod-

erately long bristles; sternal surface with shorter setae. **Lobe:** Proximal division with long stem bearing 2 narrow rods with hooked tip, upper rod inserted at apex, lower slightly basad. Distal division distinct, with a large striated leaf midway on stem, a smaller bent subapical leaf and 4 apical setae. **Clasper:** About 0.50 length of sidepiece, stout, slightly curved at middle and enlarged distally; distal 0.3 of outer surface with closely set spiculelike transverse ridges; 2 subapical setae on inner surface. **Lateral Plate:** Basal hook sclerotized, strongly curved; apical process long; sternal spine short, slightly hooked. **Proctiger:** Apex of cercal sclerite digitiform; cercal setae 1 or 2. Paraproct with a row of 6,7 blunt apical teeth.

PUPA (fig. 20). Abdomen: 2.3-2.4 mm. Trumpet: 0.45 mm; index about 6.0. Paddle: 0.55 mm. As figured; diagnostic characters as in key. **Cephalothorax:** Integument moderately pigmented, wing case slightly darker. Hairs 1-3-C usually single; 4-7-C double; 8,9-C usually single; 10-C at least 2-branched (2-4). **Trumpet:** Very strongly pigmented and strongly contrasting with cephalothorax. **Abdomen:** Integument moderately pigmented, progressively lighter caudad. Hair 1-II short, weakly branched, readily distinguishable at 100X; hair 7-II single or double; 4-VI short, weakly branched, cephalomesad of 5-VI; hair 1-VI usually double; 1-VII single; 9-VII usually triple (2-4); hair 9-VIII with 5 branches (4-7). **Paddle:** Lightly pigmented, longer than wide, about 2.0 of segment VIII. Male genital lobe extending to 0.5 and female to 0.3 of paddle.

FOURTH INSTAR LARVA (fig. 21). Head: 0.90-0.95 mm. Siphon: 2.1-2.2 mm; index 18.0-19.0. Anal Saddle: 0.35 mm. As figured; diagnostic characters as in key. **Head:** Width about 1.1 of length. Hair 4-C usually single (1,2); hair 5-C usually with 4 branches (4,5); hair 9-C short, with 6,7 weak branches; 14-C single; 15-C usually with 3 branches (2-4), short, not extending to base of mental plate. Mental plate with a strong median shouldered tooth and 7 distinct teeth on either side. **Antenna:** Length about 0.5 of head, distinctly spiculose to hair 1-A; all hairs single except 1-A (18,16-21). **Thorax:** Hair 0-P short, weak, with dendritic branches; 1,2-P long, single; 3-P long, about 0.5 of 1-P, usually single (1,2); hair 4-P double; 5,6-P single; 7-P double; 14-P small, single; 4-M double. **Abdomen:** Hair 3-I usually double (2,3); hair 6-I usually with 4 branches (3-5); hair 7-I single; 6-II moderately long, subequal to segment, usually with 3 branches (2-4); hair 6-III-V moderately long, shorter than segment; 1-V long, single. **Segment VIII:** Comb scales in a patch of 3,4 irregular rows, 48-63 in number; individual scale short, with fringed apex. **Siphon:** Integument moderately pigmented, darker basally and with a narrow dark ring. Subventral hairs (1,1a-S) 5 pairs, progressively smaller distad; subdorsal hairs (2a-S) 2 pairs, located in distal 0.25 of siphon. Pecten extending barely to proximal 0.25; individual tooth long, pointed apically, without denticles. **Anal Segment:** Integument strongly pigmented, slightly imbricate. Hair 1-X short, weakly branched; 2,3-X long, single. Gills usually short; dorsal subequal to length of saddle; ventral about 0.6 of dorsal.

SYSTEMATICS. *Culex chaguanco* can be readily separated from other members of the subgenus in the **male genitalia** by the combination of: (1) absence of setose area on sidepiece proximad of subapical lobe, (2) 1 enlarged leaf midway on stem of proximal division of lobe, and (3) short stout clasper; in the **pupa** by the combination of: (1) shorter trumpet with an index of less than 7.0, (2) hair 1-VII single, and (3) hair 1-VI usually double; and in the **larva** by the combination of: (1) hair 1-V long and single, (2) short gills, dorsal pair subequal to length of saddle, and (3) 5 pairs of subventral hairs (1,1a-S) on siphon.

Culex chaguanco was described from northern Argentina, and its distribution apparently represents the southern limit of *Anoedioporpa.*

BIONOMICS. The immature stages of *chaguanco* have been collected in treeholes, where they were associated with *Aedes (Pro.) terrens* (Walker 1856) and *Aedes (Pro.) casali* Schick 1970. All the known adults were reared from immatures, and nothing is known about the behavior of females.

DISTRIBUTION (fig. 12). *Culex chaguanco* is presently known from the provinces of Salta and Misiones in northern Argentina.

Material examined: 42 specimens; 3 males, 8 females, 11 pupae, 20 larvae; 11 individual rearings (3 larval, 8 pupal).

ARGENTINA. **Misiones**: San Pedro, Route 14, Km 327, 13 Feb 1966, O.H. Casal and M. Garcia, 1 lpF (ARG[=GA] 143-11), 1 l (143-10), 1L (143) [UCLA]. **Salta**: Dep. San Martin, nearest town Vespucio, 7 km from Tablillas, 25 Feb 1967, O.H. Casal and M. Garcia, 1 lpF (ARG[=GA] 616-10, paratype), 1 lpM (616-11, paratype), 1 pF (ARG[=GA] 618-115), 15L (618); 6 June 1969, O.H. Casal and M. Garcia, 2 pM (ARG[=GA] 773-104,-112), 5 pF (773-100,-101,-107,-108,-111) [UCLA].

8. Culex (Anoedioporpa) originator Gordon & Evans

Figs. 12,22,23

1922. *Culex originator* Gordon & Evans 1922:323-327. *TYPE: *Lectotype* male (13.2/463) with genitalia on 2 slides, Macapa, Manaos (Manaus), Amazonas, Brazil, 21 Dec 1921 (emerged 1 Jan 1922), R.M. Gordon [BM; designation of Belkin 1968b:18].

1941. *Culex (Melanoconion) surukumensis* Anduze 1941a:833-834. TYPE: male, Rio Surukum, Bolivar, Venezuela, Nov 1940, P.J. Anduze, [DPFA]. NEW SYNONYMY.

Culex (Anoedioporpa) originator of Bonne and Bonne-Wepster (1925:260,264); Belkin (1968b:12, 18); Belkin, Schick and Heinemann (1971:27); Xavier and Mattos (1975:246); Belkin and Heinemann (1976:272); Knight and Stone (1977:196); Knight (1978:41); Heinemann and Belkin (1978b:393,407,437; 1979:80,94).

Culex (Isostomyia) originator of Edwards (1932:218); Senevet and Abonnenc (1939:112-114,130, 133); Lane (1939:74); Floch and Abonnenc (1942:9; 1947:7,8); Lane and Whitman (1943: 397); Rozeboom and Komp (1948:403).

Culex (Aedinus) originator of Dyar (1923b:189); Stone, Knight and Starcke (1959:282); Stone (1963:135); Forattini (1965:27).

Culex (Melanoconion) originator of Dyar (1928:346-347); Lima (1930:255); Komp (1935:10).

Culex (Tinolestes) originator of Lane (1953:394); Duret and Damasceno (1955:394,395-397,407); Fauran (1961b:43-44); Cerqueira (1961:131-132).

Culex originator of Kumm and Novis (1937:501,511); Fauran (1961a:12-13); Aitken, Spence et al. (1969:210); Forattini, Rabello and Cotrim (1970:45; 1973:468).

Culex (Melanoconion) surukumensis of Anduze (1941b:16).

Culex (Aedinus) surukumensis of Belkin, Schick and Heinemann (1965:75).

Culex (Aedinus) conservator in part of Stone, Knight and Starcke (1959:281); Cova Garcia, Sutil and Rausseo (1966b:342-343).

Culex (Anoedioporpa) conservator in part of Knight and Stone (1977:196).

Culex (Isostomyia) conservator of Senevet and Quievreaux (1941:264).

FEMALE. Wing: 2.6 mm. Proboscis: 1.9 mm. Forefemur: 1.6 mm. Abdomen: about 2.0 mm. Essentially similar to *conservator,* differing in the following. **Head:** Decumbent scales on vertex predominantly white, a few median ones brownish. Erect scales on occiput brown. Palpus about 0.15 length of proboscis. **Thorax:** Scales on mesonotum predominantly dark brown, except for light scales on anterior promontory and along anterior part of lateral prescutal area. Scales on upper margin of *ppn* brownish. Lower *mep* area with a single bristle. Antealar area above paratergite with scattered white scales.

MALE. Wing: 2.5 mm. Proboscis: 2.1 mm. Forefemur: 1.8 mm. Similar to female in general coloration. Palpus about 0.15 length of proboscis.

MALE GENITALIA (fig. 22). As figured; diagnostic characters as in key. **Segment IX**: Tergite lobes small, moundlike, each with 5,6 short subapical setae; interlobar space wide. **Sidepiece**: Roughly oval in outline; length about 2.0 of median width; tergal surface laterad of distal division of lobe with 2 patches of bristles: an inner patch of 10-12 moderately long setae and an outer lateral group of 9-12 long bristles; sternal surface with short setae. **Lobe**: Proximal division with a long stem, setose in basal 0.5, bearing 2 distinctly separated rods with hooked tip, upper rod inserted at apex, lower basad. Distal division distinct, with a moderately long subbasal seta on stem; apex bilobed, proximal lobe with a long filament with an expanded recurved tip, a foliform seta with expanded tip and a short lanceolate seta, and distal lobe with 1 longer and 1 shorter foliform seta with expanded apex. **Clasper**: About 0.70 length of sidepiece, sharply bent mesad at middle; distal 0.3 of outer surface with spiculelike transverse ridges; 2 submedian setae on inner surface. **Lateral Plate**: Basal hook sclerotized, strongly curved, bearing distinct denticles; apical process moderately long, digitiform, pointing caudolaterad; sternal spine short, pointed. **Proctiger**: Cercal sclerite short, broad, apex sharply pointed. Paraproct with 11-13 blunt apical teeth; subapical area densely setose.

PUPA (fig. 22). Abdomen: 2.2-2.4 mm. Trumpet: 0.35-0.40 mm; index about 5.5-6.0. Paddle: 0.55-0.60 mm. As figured; diagnostic characters as in key. **Cephalothorax**: Integument lightly pigmented. Hairs 1,3-C single; 2,4,5,7-C double; 6-C single; 8,9-C usually single; 10-C at least double (2-9). **Trumpet**: Strongly pigmented and strongly contrasting with cephalothorax. **Abdomen**: Integument lightly pigmented. Hair 1-II short, weakly branched, readily distinguishable at 100X; hair 7-II usually single; 5-III single or double; 4-VI shorter, weakly branched, cephalolaterad of 5-VI; hair 1-VI,VII always single; 9-VII with 3,4 branches; 9-VIII usually 5-branched (4-6). **Paddle**: Lightly pigmented, longer than wide, about 2.0 of segment VIII. Male genital lobe extending to 0.50 and female to 0.25 of paddle.

FOURTH INSTAR LARVA (fig. 23). Head: 0.85-0.90 mm. Siphon: 1.3-2.0 mm; index 15.0-20.0. Anal Saddle: 0.35 mm. As figured; diagnostic characters as in key. **Head**: Width about 1.1 of length. Hair 4-C usually double (1,2); hair 5-C usually with 5 branches (4-7); hair 9-C usually with 7 branches (5-9); hair 14-C single; 15-C usually with 3 branches (2-4). Mental plate with a strong median shouldered tooth and 7,8 distinct teeth on either side. **Antenna**: Length about 0.5 of head, distinctly spiculose to hair 1-A; all hairs single except 1-A (14,10-16). **Thorax**: Hair 0-P short, weak, with dendritic branches; 1,2-P long, single; 3-P moderately long, about 0.5 of 1-P, usually with 4 branches (3-5); hair 4-P usually triple (2,3); hairs 5-7-P usually single; 14-P small, single; 4-M usually with 3 branches (3,4). **Abdomen**: Hair 3-I usually single (1-3); hair 6-I usually with 4 branches (3,4); hair 7-I single; 6-II moderately long, subequal to segment, usually triple (2-4); hair 6-III-V longer than segment; 1-V long, single. **Segment VIII**: Comb scales in a patch of 3,4 irregular rows, about 32-44 in number; individual scale with spatulate fringed apex. **Siphon**: Integument moderately pigmented, darker basally and with a narrow dark basal ring. Subventral hairs (1,1a-S) 4 pairs, progressively smaller distad; subdorsal hairs (2a-S) 2 pairs, short, located in distal third of siphon. Pecten extending barely to proximal 0.2; individual tooth long, pointed apically, with denticles up to basal 0.5. **Anal Segment**: Integument moderately pigmented, slightly imbricate. Hair 1-X short, weakly branched; 2,3-X long, single. Gills short; dorsal subequal in length to saddle; ventral about 0.4 of dorsal.

SYSTEMATICS. *Culex originator* is a distinct species, and is readily recognized from other members of the subgenus in the **male genitalia** by the combination of:

(1) 2 distinct patches of bristles on tergal surface of sidepiece laterad of subapical lobe, (2) a distinct, moderately long seta midway on stem of distal division of subapical lobe, (3) details of setae on apex of distal division, (4) sharply bent clasper, and (5) densely setose area on subapical part of paraproct; in the **pupa** by: (1) hair 1-VI, VII single and (2) hair 5-III single or double; and in the **larva** by the combination of: (1) hair 1-V long and single, (2) siphon with 4 pairs of subventral hairs (1,1a-S), (3) hair 5-C at least 4-branched (4-7), and (4) hair 7-P usually single, rarely double.

We have examined material of *originator* from Brazil, Guyana, French Guiana and Trinidad, and there appears to be no significant variation in the structural details of male genitalia or in the chaetotaxy of immature stages. We have also examined 1 male genitalia from Martinique and 1 larva from Grenada, and they also agree with the description of those of the type. Apparently this is the only species of *Anoedioporpa* found in the Lesser Antilles. The northern limit appears to be Martinique, but more extensive collections should be made to ascertain its presence or absence in the other islands of this chain.

On the island of Trinidad, *originator* is sympatric with *conservator,* but is not normally found in the same treehole or bamboo, thereby apparently exhibiting ecological isolation; out of a total of 52 lots, the 2 species have been collected only once from the same container (TR 100, bamboo pot). It appears to be the dominant species on this island in relation to *conservator,* having been recorded from 42 lots, as opposed to 11 lots for *conservator. Culex originator* has not been recorded to date from the island of Tobago, although *conservator* has.

We are synonymizing *surukumensis* Anduze 1941 (a former synonym of *conservator*) with *originator.* Although we have not seen the type of *surukumensis,* this nominal species appears to be conspecific with *originator* on the basis of male genitalic characters.

BIONOMICS. The immature stages of *originator* have been collected primarily in treeholes and bamboo. Mosquito studies on the island of Marajo in Brazil show that *originator* is found also in clay pots, fallen leaves on the ground and in fruit rinds (Kumm and Novis 1938:503,511). Apparently the females at least occasionally bite man, as 1 female has been taken in a biting collection in Trinidad (TR 644) at 1000-1500 hours.

DISTRIBUTION (fig. 12). *Culex originator* is presently known from Venezuela (lower Orinoco drainage), Guyana, French Guiana and Brazil (Amazon drainage), and from the islands of Martinique and Grenada (Lesser Antilles) and Trinidad.

Material examined: 488 specimens; 64 males, 65 females, 124 pupae, 235 larvae; 115 individual rearings (83 larval, 15 pupal, 17 incomplete).

BRAZIL. **Amazonas**: Manaus, Macapa, 21 Dec 1921, R.M. Gordon, 1M (13.2/463) [BM, lectotype]. **Para**: Belem, IPEAN, Reserva de Aura, 1-10 m, 8 Aug 1969, B.T. and B.G. Aitken, 2 lpM (BRA 26-11,-14), 1 pF (26-10), 1 lP (26-12), 2L (26); 1-30 m, 29 July 1970, T.H.G. Aitken, 1 lpF (BRA 54-22), 1 lF (54-23), 2L (54) [UCLA]. Belem, Utinga Forest, 35 m, 5 Aug 1969, B.T. and B.G. Aitken, 1 l (BRA 16-11), 1L (16) [UCLA]; det. A. Toda [FH, 15855-91,E499-507]. Curralinho, Recreio do Piria, Rio Aracairou, 1F (K427) [USNM]. Curralinho, Rio Canaticu, 3M, 1F (K 285) [USNM]. Curralinho, Rio Itaucu, 1935, 1M (61) [USNM]. Curralinho, Rio Aramakari, Rio Muruaca, Rio Pariaca [INER; Xavier and Mattos 1975:246]. Curralinho, Ilha de Marajo (Kumm and Novis 1938:503,511).

FRENCH GUIANA. **Guyane**: Approuague, det. Floch [FH, 6331]. Cayenne, foret de Cabassou, 5-100 m, 22 May 1967, J. Clastrier, 1 lP (FGC 3146-14), 9L (3146); 9 June 1968, J. Clastrier, 1 pM (FGC 3470-16), 1 pF (3470-14), 2M (3470-20,-22), 4F (3470-13,-15,-23,-24); 14 July 1968, J. Clastrier, 1 pF (FGC 3519-30); 8 Sept 1968, J. Clastrier, 1 lpM (FGC 3642-33), 1 lpF (3642-32), 2 pF (3642-31,-34), 1 lpF (FGC 3643-31), 1 lpM (FGC 3644-37), 3 lpF (3644-35,-36,-38), 2 pM

(3644-32,-33), 1 pF (3644-30); 1 Dec 1968, J. Clastrier, 3 lpM (FGC 3903-46,-51,-52), 4 lpF (3903-42,-44,-47,-49), 2 pM (3903-46,-50), 1 pF (3903-43), 2F (3903-41,-48), 1M, 4L (3903); 9 June 1968, J. Clastrier, 1 lpM (FGC 3470-30) [UCLA]. Cayenne, foret de la Chaumiere, 5-150 m, 1 Apr 1968, J. Clastrier, 1M (FGC 3335-11), 1F (3335-10), 1 lpM (FGC 3338-14), 2M (3338-10, -13), 1F (3338-11), 4L (3338), 1 p (FGC 3340-13) [UCLA]. Cayenne, Institut Pasteur, 5 m, 1 May 1967, J. Clastrier, 1Mgen (FGC 3116) [UCLA]. Cayenne, Raban, 5 m, 2-3 Feb 1965, T.H.G. Aitken, A. Guerra and R. Martinez, 1F (FG 43) [UCLA]. Remire, between Lac de Remire and Lac Lalouette, 150 m, 18 Mar 1967, R.X. Schick, 2 lpM (FG 162-10,-11) [UCLA]. Various localities (Floch and Abonnenc 1942:9; 1947:7; Fauran 1961b:43-44). **Inini**: Various localities, including Saut Tigre (Fauran 1961b:43-44).

GRENADA. **St. Andrew**: Grenville, Balthasar Estate, 150 m, 15 Oct 1963, R. Martinez, 1L (GR 43) [UCLA].

GUYANA. Mazaruni River, 29 June 1936, 1M (KO 1-9) [UCLA].

MARTINIQUE. Fort-de-France, 20 July 1905, A. Busck (Howard, Dyar and Knab 1915:310). Locality unspecified but presumably the basis for the previous record, July 1905, A. Busck, 1M with genitalia slide (690723-3) [USNM].

TRINIDAD. **Nariva**: Archers Estate, 50m, 5 Nov 1964, A. Guerra, 2 lp (TR 818-124,-125), 3L (818) [UCLA]. Biche, Caratal Rd., 10 m, 3 Dec 1964, F. Powdhar, 7L (TR 864) [UCLA]. Charuma Forest, 50-150 m, 27 Aug 1964, A. Guerra, 1 lpM (TR 634-106), 2L (634), 1F (TR 644); 8 Oct 1964, A. Guerra, 5L (TR 753), 5L (TR 754) [UCLA]. Nariva Swamp, Bush Bush Forest, near sea level, 17 Feb 1964, TRVL, 2 lpM (TR 73-136,-139), 3 lpF (73-137,-138,-140), 2 pF (73-131, -132); 26 Feb 1964, TRVL, 1 lpF (TR 98-142), 3 lpF (TR 99-148-150), 1 lpM (TR 100-103), 1L (TR 102); 4 Mar 1964, TRVL, 6 lpM (TR 155-118,-120,-185,-186,-190,-199), 4 lpF (155-101,-102, -119,-200), 1 lF (155-184), 4L (155); 13 May 1964, TRVL, 3 lpM (TR 386-115,-116,-197), 4 lpF (386-114,-117,-181,-198), 1 pF (386-110), 1 lpF (TR 387-109) [UCLA]. **St. Andrew**: Arima, det. J. Lane [FH, 10262-3,E-1287-97]; det. Heredia [FH, 10930-43]. Coryal, 50 m, 18 June 1964, A. Guerra, 2 lpM (TR 491-128,-129), 3 lpF (491-121,-122,-154), 9L (491) [UCLA]. Cumaca, 150-200 m, 22 Oct 1964, TRVL, 3 lpM (TR 785-102,-104,-106), 2 lpF (785-101,-105), 1M, 1F, 2P, 2L (785); 14 Jan 1965, A. Guerra, 2M, 1F, 2P, 3L (TR 942); 18 Feb 1965, TRVL, 4 lpM (TR 1012-12-15), 1 lpF (1012-11), 12L (1012) [UCLA]. Mount Harris, 100 m, 16 July 1964, F. Powdhar, 5L (TR 566) [UCLA]. Platanal Rd. near Oropuche River, 100 m, 20 May 1965, A. Guerra, 1 lpM (TR 1179-12), 4 lpF (1179-13-16), 1 pF (1179-11), 2F, 2P, 13L (1179) [UCLA]. Turure Forest, 30 m, 7 May 1966, A. Guerra, 1 lpM (TR 1511-11), 2 lpF (1511-10,-12) [UCLA]. **St. David**: Grande Riviere, 50 m, 13 Mar 1964, A. Guerra, 3 pM (TR 199-123,-125,-128) [UCLA]. **St. George**: Arena Forest Reserve, 50 m, 3 Sept 1965, F. Powdhar, 1 pM (TR 1386-100) [UCLA]. Aripo Valley, 150-250 m, 16 Apr 1964, A. Guerra, 3 lpF (TR 317-125,-127,-157); 17 Sept 1964, A. Guerra, 10L (TR 704), 2L (TR 706), 8L (TR 707), 1L (TR 708), 4L (TR 709), 10L (TR 710); 25 Feb 1965, F. Powdhar, 1 pM (TR 1022-10), 1 pF (1022-11), 1L (1022); 15 Apr 1965, A. Guerra, 1 lpF (TR 1107-10) [UCLA]. Blanchisseuse, 10 m, 10 Apr 1964, A. Guerra, 4 lpM (TR 305-136,-144,-147,-149), 4 lpF (305-143,-145,-146,-148) [UCLA]. St. Joseph, 50 m, 9 Sept 1965, A. Guerra, 1 lpM (TR 1391-20) [UCLA]. St. Patrick Estate, 200 m, 5 Feb 1966, A. Guerra, 2L (TR 1457), 1L (TR 1458) [UCLA]. Verdant Vale, 200-300 m, 10 Sept 1964, A. Guerra, 1L (TR 675); 12 Nov 1964, A. Guerra, 5L (TR 825); 11 Mar 1965, A. Guerra, 1 lpF (TR 1028-19), 2 lpM (TR 1038-11,-13), 3 lpF (1038-12,-14,-15), 9L (1038); 25 Mar 1965, M. Moody, 1 lpM (TRM 13-51), 3L (13), 1 lpF (TRM 14-50) [UCLA].

VENEZUELA. **Bolivar**: Headwaters of Rio Surukum, Nov 1940 (Anduze 1941a:833-834).

9. Culex (Anoedioporpa) quasioriginator Duret

Fig. 12

1972. *Culex (Anoedioporpa) quasioriginator* Duret 1972:3-5. TYPE: *Holotype* male (1334), Pirelli, near Belem, Para, Brazil, 16 Jan 1963, J. Duret [Duret].

Culex (Anoedioporpa) quasioriginator of Xavier and Mattos (1975:246); Knight and Stone (1977: 196).

FEMALE. Unknown.

MALE. Not seen; based on description of Duret (1972:3-5). Very similar in details to *originator.*

MALE GENITALIA. Not seen; description based on Duret (1972:3-5). Diagnostic characters as in key. **Segment IX:** Tergite lobes small, moundlike, each with 5 subapical setae; interlobar space wide. **Sidepiece:** Distal part with long bristles on tergal surface; sternal surface with shorter setae. **Lobe:** Proximal division with a long stem, bearing 2 approximate rods with hooked tip, upper rod inserted at apex, lower slightly basad. Distal division distinct, with a moderately long subbasal seta on stem; apex bilobed, proximal lobe with a long filament with expanded tip, a longer lanceolate seta and a shorter pointed seta, and distal lobe with 1 longer foliform seta with expanded apex and a lanceolate seta. **Clasper:** About 0.70 length of sidepiece, sharply bent mesad at middle; distal 0.3 of outer surface with spiculelike transverse ridges; 2 submedian setae on inner surface. **Lateral Plate:** Basal hook sclerotized, strongly curved, bearing distinct denticles; apical process digitiform; sternal spine short, pointed. **Proctiger:** Cercal sclerite short, broad, apex pointed. Paraproct with 9 blunt apical teeth; subapical area densely setose.

PUPA, LARVA. Unknown.

SYSTEMATICS. *Culex quasioriginator,* described from the state of Para in Brazil, is known only by the males. In the **male genitalia,** it is distinguished from all other members of the subgenus except *originator* by the presence of a densely setose area on the paraproct, and from *originator* by the absence of a setose area on the stem of proximal division of subapical lobe. We have not seen the types of *quasioriginator,* but from the description this species appears to be distinct, although closely related to *originator* with which it is sympatric in Para.

BIONOMICS. The immature stages of *quasioriginator* are unknown, but they probably occur in treeholes or bamboo. Nothing is known about the behavior of the adult females. Apparently all the males have been caught in sweeping collections.

DISTRIBUTION (fig. 12). *Culex quasioriginator* is presently known only from the state of Para in Brazil.

Material examined: none.

BRAZIL. **Para:** Belem, 18 Aug 1953, J. Duret, 2M (4702,4712); Pirelli, 14 Jan 1963, J. Duret, 2M (555,581); 16 Jan 1963, J. Duret, 10M (557,558,579,580,1327,1334,1335,3783,3786,3788) [type series] ; Rio Guajaru (Oriboca), 23 Aug 1963, J. Duret, 2M (4710,4715); Utinga, 26 Oct 1962, J. Duret, 1M (1336). Sao Domingos do Capim, Paragominas, 24 June 1964, J. Duret, 1M (1336) (Duret 1972:4-5).

10. Culex (Anoedioporpa) luteopleurus (Theobald)

Figs. 12,26

1903. *Melanoconion luteopleurus* Theobald 1903:239-240. *TYPE: *Holotype* female, Para, Brazil, date not specified, H.E. Durham [BM] .

Culex (Anoedioporpa) luteopleurus of Belkin, Schick and Heinemann (1971:27); Knight and Stone (1977:196).

Culex (Micraedes) luteopleurus of Belkin (1968b:11,17); Xavier and Mattos (1975:249).

Culex (Aedinus) luteopleurus of Stone, Knight and Starcke (1959:282).

Culex (Melanoconion) luteopleurus of Dyar (1928:348-349); Edwards (1932:216); Komp (1935: 10); Lane (1939:67; 1953:495-496); Rozeboom and Komp (1950:98).

Culex (Tinolestes) luteopleurus of Duret and Damasceno (1955:395,397-401,404,407,408); Fauran (1961b:48); Cerqueira (1961:133).

Culex luteopleurus of Forattini, Rabello and Cotrim (1970:43; 1973:468).

Melanoconion luteopleurus of Lutz (1904a:5); Peryassu (1908:240-241); Theobald (1910:455, 456); Surcouf and Gonzalez-Rincones (1911:208).

FEMALE. Specimen greasy and therefore characters based on original description (Theobald 1903:239-240). Similar to *conservator,* differing in the following. **Head:** Decumbent scales on vertex narrow, dull gray. Erect scales on occiput bright yellow. Palpus about 0.15 length of proboscis. **Thorax:** Scales on mesonotum black, linear. Antealar area above paratergite with black scales. Pleural integument bright yellow. Scales on upper margin of *ppn* broad, brown. Lower *mep* with a strong bristle.

MALE. The association of male *luteopleurus* with the holotype female by Duret and Damasceno (1955:398) is questionable, because no individual rearings were made, without which no association can be ascertained.

MALE GENITALIA (fig. 26). Not seen; figure and description based on Duret and Damasceno (1955:399-400). Diagnostic characters as in key. **Segment IX:** Tergite lobes indistinct, each with 8-10 weak setae; interlobar space wide. **Sidepiece:** Roughly conical; length about 2.0 of greatest width; lateral surface with longer bristles; sternal surface with shorter setae. **Lobe:** Proximal division long, with a row of 4 setae in basal 0.5 of stem and bearing 2 distinctly separated rods with hooked tip, upper rod inserted at apex, lower slightly basad. Distal division distinct, with 4 enlarged striated leaves midway on stem and 1 leaf subapically; apex with a strong, sinuous filament with an expanded recurved tip and 1 smaller lanceolate seta. **Clasper:** About 0.50 length of sidepiece, sharply curved at middle; distal 0.5 expanded, with a row of spiculelike transverse ridges on outer surface; 2 subapical setae on inner surface. **Lateral Plate:** Basal hook sclerotized, strongly curved; apical process long; sternal spine short, slightly hooked. **Proctiger:** Cercal setae 3. Paraproct with 9 blunt apical teeth.

PUPA, LARVA. Unknown.

SYSTEMATICS. The original description of *luteopleurus* is based on a female collected in an unspecified locality (possibly in or near Belem) in the state of Para, Brazil. No other specimens were reported until 1954, when Duret and Damasceno collected some males in Yaguarari and Oriboca in the state of Para, which they provisionally identified as *luteopleurus.* Therefore, the association of sexes is only presumptive.

Culex luteopleurus can be distinguished from all other members of the subgenus in the **adults** by: (1) bright yellow erect scales on vertex and (2) antealar area above paratergite with black scales; and in the **male genitalia** by the combination of: (1) IX tergite lobes indistinct, (2) stem of proximal division of subapical lobe with 4 setae in basal 0.5, and (3) stem of distal division of subapical lobe with 5 submedian leaves. On the basis of male genitalic characters, *luteopleurus* appears to be a very distinct member of the subgenus *Anoedioporpa.*

BIONOMICS. The immature stages of *luteopleurus* are unknown, but like other members of the subgenus will probably be found in treeholes and/or bamboo. The holotype female and the males were presumably taken in sweeping collections.

DISTRIBUTION (fig. 12). *Culex luteopleurus* is at present known only from the state of Para, Brazil at low elevations.

Material examined: holotype female examined by J.N. Belkin [BM].

BRAZIL. **Para:** Date and exact locality unspecified, H.E. Durham [BM, holotype]. Belem, Oriboca, Rio Guajaru (Br59,E.16); Rio Moju, Yaguarari (Br41,E.1) [Duret]; Rio Moju, Yaguarari (Br41,E.2) [FH, 10,551]; Utinga [FH, E485-498,E820,E821].

11. Culex (Anoedioporpa) corrigani Dyar & Knab

Figs. 12,24,25

1907. *Culex corrigani* Dyar & Knab 1907:203. *TYPE: *Holotype* female, Tabernilla, Canal Zone, Panama, date not specified, A. Busck [USNM, 10870].

1914. *Culex chalcocorystes* Martini 1914:70-74. *TYPE: *Lectotype* male (538), Portobelo, Colon, Panama, Nov 1913, E. Martini [BM; designation of Mattingly 1955:31]. Synonymy with *corrigani* by Dyar (1922:95).

Culex (Anoedioporpa) corrigani of Bonne and Bonne-Wepster (1925:188,260,264); Belkin (1968b: 12,14); Heinemann and Belkin (1977a:283; 1977b:452; 1978a:183); Knight and Stone (1977: 196).

Culex (Isostomyia) corrigani of Edwards (1932:328); Komp (1936:327); Lane (1939:74); Rozeboom and Komp (1948:403); Galindo, Carpenter and Trapido (1951:102,104,105,108,110, 111,112,113,126); Horsfall (1955:548).

Culex (Aedinus) corrigani of Dyar (1923b:189); Stone, Knight and Starcke (1959:282); Belkin, Schick and Heinemann (1965:56).

Culex (Melanoconion) corrigani of Dyar (1925:158,161,169; 1928:347).

Culex (Micrades) corrigani of Gordon and Evans (1922:327); Dyar (1922:95,96; 1923:177).

Culex (Tinolestes) corrigani of Lane (1953:392-393); Galindo and Blanton (1955:70).

Culex corrigani of Theobald (1910:614); Howard, Dyar and Knab (1915:222,223,229,386-387); Galindo, Carpenter and Trapido (1955:159,161); Stone and Knight (1957:58); Forattini, Rabello and Cotrim (1970:39).

Culex (Micraedes) chalcocorystes of Dyar (1918:90,102).

FEMALE. Wing: 2.8 mm. Proboscis: 1.9 mm. Forefemur: 1.6 mm. Abdomen: about 1.8 mm. Essentially similar to *conservator,* differing in the following. **Head:** Decumbent scales on vertex white. Erect scales on occiput pale brown. Palpus about 0.14-0.15 length of proboscis. **Thorax:** Acrostichal bristles represented by 3,4 short setae cephalad of prescutellar space. Antealar area above paratergite with scattered white scales. Pleural integument pale yellow, finely spiculose. Lower *mep* area bare.

MALE. Wing: 2.7 mm. Proboscis: 2.1 mm. Forefemur: 1.75 mm. Similar to female in general coloration. Palpus about 0.14 length of proboscis.

MALE GENITALIA (fig. 24). As figured; diagnostic characters as in key. **Segment IX:** Tergite lobes distinct, moundlike, each with 6-9 short to moderately long setae; interlobar space wide. **Sidepiece:** Roughly conical; length about 2.0-2.3 of greatest width; tergal and sternal surfaces with shorter setae; lateral surface with long bristles; tergomesal surface caudad of proximal division with a few short fine setae; 1 seta laterad of distal division of lobe usually lanceolate. **Lobe:** Proximal division with a short stem bearing 2 rods with hooked tip, larger rod inserted at apex, smaller slightly basad. Distal division poorly developed, wider than long, bearing 1 foliaceous seta, 4 specialized setae with recurved apexes and 2,3 shorter lanceolate setae. **Clasper:** About 0.60 length of sidepiece, stout, smoothly curved; distal 0.3 of outer surface with closely set spiculelike transverse ridges; 1 submedian and 1 subapical seta on inner surface. **Lateral Plate:** Basal hook sclerotized, strongly curved, bearing a few subapical spines; apical process narrow basally, broadly truncate at tip; sternal spine short, pointed. **Proctiger:** Cercal sclerite long, broad, smoothly rounded at apex, directed caudomesad; cercal setae 2-4. Paraproct with a row of 6-8 blunt apical teeth.

PUPA (fig. 24). Abdomen: 2.4-2.7 mm. Trumpet: 0.45 mm; index 5.0-6.0. Paddle: 0.55 mm. As figured; diagnostic characters as in key. **Cephalothorax:** Integument lightly pigmented. Hairs 1-3-C usually double; 4,5-C triple; 6,7-C double or

triple; 8,9-C single; 10-C at least 3-branched. **Trumpet**: Moderately pigmented and strongly contrasting with cephalothorax. **Abdomen**: Integument lightly pigmented. Hair 1-II short, weakly branched, easily distinguishable at 100X; hair 7-II usually single; 4-VI short, weakly branched, cephalomesad of 5-VI; hair 1-VI,VII at least double; 9-VII at least 4-branched (4-6); hair 9-VIII usually with 7 branches (6-8). **Paddle**: Lightly pigmented, longer than wide, about 2.0 of segment VIII. Male genital lobe extending to 0.35 and female to 0.20 of paddle.

FOURTH INSTAR LARVA (fig. 25). Head: 0.85-0.90 mm. Siphon: 2.1-2.3 mm; index about 20.0-30.0. Anal Saddle: 0.35-0.40 mm. As figured; diagnostic characters as in key. **Head**: Width about 1.1 of length. Subantennal pouch distinct, dome shaped. Hair 4-C single; 5-C usually with 4 branches (3-5); hair 9-C usually with 4 branches (4-6); hair 14-C single; 15-C usually with 3 branches (2-4), short, not extending to base of mental plate. Mental plate with a strong median shouldered tooth and 7 distinct teeth on either side. **Antenna**: Length about 0.5 of head, distinctly spiculose to hair 1-A; all hairs single except 1-A (22,20-29). **Thorax**: Hair 0-P short, weak, with dendritic branches; 1,2-P long, single; 3-P long, about 0.3 of 1-P, usually single; 4-P usually with 3 branches (3,4); hairs 5,7-P long, single; 14-P short, single; 4-M usually double (1-3). **Abdomen**: Hair 3-I usually with 3 branches (2,3); hair 6-I usually with 3 branches (2-4); hair 7-I single; 6-II longer than segment, usually triple (2,3); hair 6-III-V moderately long, always shorter than segment, triple; 1-V short, never extending beyond segment V, weakly branched(4,3-6). **Segment VIII**: Comb scales in a patch of 3,4 irregular rows, about 48-76 in number; individual scale with spatulate fringed apex. **Siphon**: Very long, index variable. Integument moderately pigmented, with a narrow basal dark ring; distinctly spiculose, spicules wartlike. Subventral hairs (1,1a-S) usually 6 pairs (rarely 5), progressively smaller distad; subdorsal hairs (2a-S) 2 pairs, located in distal 0.15 of siphon. Pecten short, extending barely to proximal 0.15; individual tooth long, pointed apically, with minute ventral denticles. **Anal Segment**: Integument strongly pigmented, imbricate and slightly spiculose, spicules visible at 200X. Hair 1-X short, weakly branched; 2,3-X long, single. Gills long; dorsal 2.0-2.5 length of saddle; ventral slightly shorter than dorsal.

SYSTEMATICS. *Culex corrigani* is distinct from all other members of the subgenus in both the adult and immature stages. In the **adults**, it is distinguished by the combination of: (1) 3,4 acrostichal bristles near prescutellar area and (2) lower *mep* bare; in the **male genitalia** by the combination of: (1) poorly developed distal division of subapical lobe, (2) moderately broad, stout clasper, and (3) broad digitiform cercal sclerite; in the **pupa** by the combination of: (1) hair 1-VII at least double and (2) 4-VI cephalomesad of 5-VI; and in the **larva** by: (1) hair 1-V short, barely extending to apex of segment, multiple, (2) long siphon with an index of about 20.0-30.0, and (3) usually 6 pairs of subventral siphon hairs (1,1a-S).

We have seen material of *corrigani* from Nicaragua, Costa Rica and Panama, and have not noticed any significant variations either in the adults or in the immature stages.

We have also examined the type of *chalcocorystes* Martini 1914, and in our opinion its synonymy with *corrigani* by Dyar (1922:95) is justified.

BIONOMICS. The immature stages of *corrigani* are usually found in treeholes. According to Galindo, Carpenter and Trapido (1951:127), the immature stages show preference for breeding in deep holes in trees growing in virgin forest. The larvae were also found in bamboo traps near the ground and in the forest canopy. Nothing is known about the behavior of the adult females.

DISTRIBUTION (fig. 12). *Culex corrigani* is Central American in distribution, having been reported from Nicaragua (Atlantic), Costa Rica (Atlantic) and Panama (Atlantic and Pacific) at low (near sea level) to moderate (600 m) elevations. The record from Colombia (Knight and Stone 1977:196) is apparently in error.

Material examined: 194 specimens; 52 males, 45 females, 33 pupae, 64 larvae; 35 individual rearings (18 larval, 10 pupal, 7 incomplete).

COSTA RICA. **Heredia**: Puerto Viejo, Finca La Selva, OTS Field Station, 100 m, 8 Aug 1971, A. Berrios A., 3 lpM (CR 433-30,-31,-33), 3 lpF (433-32,-34,-35), 1L (433) [UCLA].

PANAMA. **Bocas del Toro**: Almirante, 10 m, 27 Apr 1963, A. Quinonez, 1 pM (PA 259-119), 2L (259); 7 May 1963, A. Quinonez, 1 lpF (PA 335-107), 1 pM (335-110), 3 pF (335-103,-105, -111), 1 lP (335-106), 2L [UCLA]. **Canal Zone**: Barro Colorado Is., 18 Jan 1935, 1Mgen [USNM]; 7 May 1943, W.H.W. Komp, 1M (KO 37-18), 5M, 4F (KO 37-24), 1M (KO 41-9), 1M (KO 41-18), 1F (KO 41-19), 1M, 1F (KO 41-32), 3M (KO 41-24), 1F (KO 41-27), 6M, 2F (KO 41-29), 1F (KO 41-30), 1M, 1F (KO 41-33); 21 May 1943, W.H.W. Komp, 1M (KO 41-14), 1F (KO 41-15), 1 F (KO 41-16), 2F (KO 41-20), 1M (KO 41-23), 2F (KO 41-25), 1M, 1F (KO 207A-35); 21 May 1943, G.B. Fairchild, 2M (KO 37-40); 13 May 1945, 3L (5-336,-366); 15 May 1945, 1L (5-392); 18 May 1945, 1L (5-414); 23 May 1945, 4L (5-367,-382,-389,-406); 26 June 1945, 1L (5-411) [UCLA]; no date, det. J. Lane [FH, 6369,6370]. Fort Sherman, 5 Jan 1926, D. Baker, 1M, 3F [USNM]. Mojinga Swamp, 5 m, 13 Oct 1964, A. Quinonez, 1 pF (PA 722-101), 3L (722) [UCLA]. S. Gamboa Trail, 9 June 1943, Elton, 2M (KO 37-12) [UCLA]. Tabernilla, A. Busck, 1L [USNM], 1F [USNM, 10870; holotype of *corrigani*]. **Colon**: Portobelo, no data [FH, 8938]; 18-24 Feb 1911, A. Busck, 1M, 11F; 25 Feb 1911, A. Busck, 1M, 2F; 13 Mar 1911, A. Busck, 3M [USNM]; Nov 1913, E. Martini, 1Mgen, 1F [USNM, 18466; type series of *chalcocorystes*]; Nov 1913, E. Martini, 1M (538) [BM, lectotype]. **Darien**: El Real, Piriaque, near sea level, 13 Jan 1964, A. Quinonez, 4L (PA 622) [UCLA]. Morti, Morti Hydro, 80 m, 1 Dec 1966, O.G.W. Berlin and R. Hinds, 1 pM (PA 967-100), 1L (967) [UCLA]. Pucro, Rio Tacarcuna valley, 600 m, 5 July 1963, A. Quinonez, 2 pM (PA 438-101,-103), 1 pF (438-102); 8 July 1963, A. Quinonez, 6 lpM (PA 442-101,-103-105,-108,-110), 6 lP (442-102,-107,-109,-111-113), 1L (442) [UCLA]. Santa Fe, 20 m, 22 Nov 1966, O.G.W. Berlin, 1 lpM (PA 945-11), 1 lpF (945-10) [UCLA]. **Panama**: Juan Mina, 40 m, 18 Jan 1963, A. Quinonez, 1 lpM (PA 5-104), 1 lM (5-109), 2L (5) [UCLA]. Pacora, 22 Dec 1950, S.J. Carpenter, 1L; 26 Dec 1950, S.J. Carpenter, 4L [UCLA]. **Province not specified**: Santa Clara, La Venta, 9 Apr 1943, 1M, 1F [USNM]. No data, det. Galindo [FH, 9011].

NICARAGUA. **Zelaya**: Bluefields, near sea level, 14 July 1964, A. Quinonez, 1 lpM (NI 48-10), 5L (48) [UCLA].

Restrictor Group

FEMALE. Small to moderate in size, inornate species. **Head**: Erect scales forked apically, brown. Proboscis slightly longer than forefemur, entirely dark scaled. Palpus short, about 0.20 length of proboscis, 4-segmented, segment 4 about 2.0 of segment 3. Antenna slightly shorter than proboscis. **Thorax**: Mesonotal scales linear, auburn. Acrostichal bristles distinct, extending from anterior promontory to prescutellar space. Pleural integument yellowish; scaling restricted to upper *ppn* and *stp*; lower *mep* with 1 strong bristle. **Abdomen**: Tergites II-VII with basolateral light patches, rest dark scaled; sternites predominantly creamy, dark scaled distally.

MALE. Similar to female in coloration. Palpus long, subequal to proboscis length, 5-segmented; segment 3 long; segment 4 short, about 0.30-0.33 of segment 3; segment 5 shorter, about 0.60 of segment 4.

MALE GENITALIA. **Segment IX**: Tergite lobe moundlike, with 12-18 moderately long setae. **Sidepiece**: Roughly conical, length about 2.0 of greatest width. **Lobe**

situated at 0.7, directed caudomesad, divided into distinct, approximated proximal and distal divisions; proximal division with 2 distinct rods; distal division with 4 apical leaves in addition to 2,3 specialized setae. **Clasper**: About 0.65 length of sidepiece, relatively simple and curved inward. **Phallosome**: Lateral plate with apical process broadly truncate from dorsal aspect; sternal spine directed basolaterad. **Proctiger**: Paraproct with 6-8 apical teeth; cercal setae 2-5.

PUPA. **Cephalothorax**: Hair 5-C moderately long, weakly developed, subequal in length to 4-C; hair 10-C strongly developed, single or double, distinctly longer than 11-C. **Abdomen**: Hair 1-II with 3-5 moderately long branches, not resembling float hair (1-I); hair 1-III-VII varied in branching; 6-I,II long, about 2.0 of 7-I,II; hair 5-IV,V moderately long, double, barely extending to apex of succeeding segment; 2-II-VI subequal in length to 9-II-VI; hair 9-VII,VIII strongly developed, at least 4-branched; 9-VIII subequal in length to segment VIII; hair 1-IX absent. Posterior margin of sternum VIII lobed laterad of 9-VIII. **Paddle**: Elongate, lightly pigmented; hairs 1,2-P absent.

FOURTH INSTAR LARVA. **Head**: Hair 5-C usually 3-branched; 6-C single; 7-C with 7-9 and 11-C with 4,5 branches. Central tooth of mental plate simple. **Antenna**: Hair 1-A inserted about 0.70 from base. **Thorax**: Hairs 5-7-P single, strongly developed. **Abdomen**: Hair 6-III-V moderately long, about 0.75 length of 6-I,II; hair 9-II-VI short, single. **Segment VIII**: Hair 2-VIII on an oval sclerotized plate. **Siphon**: Subventral hairs (1,1a-S) 5 pairs; subdorsal hairs (2a-S) 5 pairs, middle ones sometimes unpaired; proximal subdorsals always within last pecten tooth. **Anal Segment**: Ventral brush (4-X) with 6 pairs of hairs on a grid. Gills short, ventral slightly shorter than dorsal.

DISCUSSION. The Restrictor Group is recognized here for the nominate form. This species, originally described from Mexico, was included in the subgenus *Microculex* by Stone, Knight and Starcke (1959:280) and Knight and Stone (1977:269). On the basis of correlated features of adults and immatures, it appears to be more closely related to species in the subgenus *Anoedioporpa* than to any other subgenus of *Culex* in the New World. Within the subgenus, it is distinct from all the other members in the adults and immature stages. The **adults** are readily distinguishable by the presence of acrostichal bristles on the mesonotum from the anterior promontory to prescutellar space. The **pupa** is easily separated by the longer, strongly developed hair 10-C. The **larva** is diagnosed by the presence of 6 pairs of hairs in the ventral brush, and a sclerotized plate at the base of hair 2 on segment VIII. This group has retained more ancestral characters than the Conservator Group and is restricted to the Middle American area.

The Restrictor Group is known at present only from the mainland of Central America, from Mexico as far north as the states of Jalisco and San Luis Potosi, and from the state of Aragua in Venezuela (fig. 27). The immature stages are found in treeholes at low to moderately high (1700 m) elevations.

12. Culex (Anoedioporpa) restrictor Dyar & Knab

Figs. 27,28,29,30

1906. *Culex restrictor* Dyar & Knab 1906:222. *TYPE: *Holotype* larval skin (311c) with associated whole female pupa on slide, Almoloya, Oaxaca, Mexico, 21 July 1905, F. Knab [USNM]. Information in Belkin, Schick and Heinemann 1965:38.

1908. *Culex consternator* Dyar & Knab 1908:59. *TYPE: *Lectotype* male (429.1), Cordoba, Veracruz, Mexico, 7 Mar 1908, F. Knab [USNM 11969; designation of Stone and Knight 1975:46]. Synonymy with *restrictor* by Howard, Dyar and Knab 1915:333.

Culex (Anoedioporpa) restrictor of Dyar (1923b:190); Heinemann and Belkin (1977a:283; 1977b: 427,433; 1977c:528; 1978a:183; 1978b:393).
Culex (Melanoconion) restrictor of Dyar (1925:169; 1928:348); Edwards (1932:217); Martini (1935:60); Lane (1939:70).
Culex (Microculex) restrictor of Lane (1953:527-528); Galindo and Blanton (1955:73); Stone, Knight and Starcke (1959:280); Belkin, Schick and Heinemann (1965:38); Diaz Najera and Vargas (1973:120); Knight and Stone (1977:269).
Culex (Micraedes) restrictor of Dyar (1918:102).
Culex (Aedinus) restrictor of Dyar (1923:189-190,191).
Culex restrictor of Dyar and Knab (1906:208); Howard, Dyar and Knab (1915:331); Galindo, Carpenter and Trapido (1955:159,160); Forattini, Rabello and Cotrim (1970:47).

FEMALE (fig. 28). Wing: 3.2 mm. Proboscis: 2.0 mm. Forefemur: 1.7 mm. Abdomen: 2.2 mm. As described for subgenus and group, with the following additional features. **Head:** Decumbent scales on vertex narrow, white; sides and venter with broader white scales. Erect scales auburn. Palpus short, about 0.20 length of proboscis. **Thorax:** Mesonotal scales narrow, auburn except for white scales on anterior promontory and along anterior part of lateral prescutal area. Antealar area above paratergite with narrow auburn scales. Pleural integument yellowish. Upper margin of *ppn* with auburn scales. Lower *mep* with a strong bristle. **Abdomen:** Scales on tergites predominantly dark except for basolateral light areas. Sternites predominantly creamy, dark scaled distally.

MALE (fig. 28). Wing: 2.7 mm. Proboscis: 1.8 mm. Forefemur: 1.5 mm. Similar to female in general coloration. Palpus subequal to length of proboscis.

MALE GENITALIA (fig. 29). As figured; diagnostic characters as in key. Readily separated from all members of the subgenus by the presence of 4 apical leaves on distal division of subapical lobe. **Segment IX:** Tergite lobes distinct, widely separated, each with 12-14 moderately long setae. **Sidepiece:** Roughly conical; length about 2.0 of greatest width; tergal surface with a few longer bristles; sternal surface with shorter setae and a few scales basally. **Lobe:** Proximal division with a moderately long stem bearing 2 rods with hooked tip, upper rod inserted at apex, lower slightly basad. Distal division distinct, stem short, bearing apically 1 short and 1 longer specialized seta with hooked tip, and 4 leaves. **Clasper:** About 0.60 length of sidepiece, smoothly curved mesad; 1 submedian and 1 subapical seta on inner surface. **Lateral Plate:** Basal hook sclerotized, strongly curved; apical process long, broadly truncate at tip; sternal spine short, pointed. **Proctiger:** Apex of cercal sclerite broad, triangular; cercal setae 2-8. Paraproct with a row of 6-8 blunt apical teeth.

PUPA (fig. 29). Abdomen: 2.5 mm. Trumpet: 0.45-0.50 mm; index about 7.0. Paddle: 0.6 mm. As figured; diagnostic characters as in key. **Cephalothorax:** Lightly to moderately pigmented, wing case darker. Hairs 1-5-C moderately long, always double; 6-C at least 3-branched (3-5); hair 7-C double; 8-C usually double; 9-C single; 10-C single or double, longer than 11-C; hairs 11,12-C single. **Trumpet:** Very strongly pigmented and strongly contrasting with cephalothorax. **Abdomen:** Integument lightly to moderately pigmented, progressively lighter caudad, imbricate. Hair 1-II moderately long, extending beyond middle of succeeding segment, branched; 7-II double; 4-VI short, usually double, cephalad of 5-VI; hair 1-VI,VII at least double (2-5); hair 9-VII with 4-6 branches; 9-VIII with 4-7 branches. **Paddle:** Lightly pigmented, longer than wide, about 2.0 of segment VIII and finely spiculose ventrally; apex slightly produced. Male genital lobe extending to 0.4 and female to 0.2 of paddle.

FOURTH INSTAR LARVA (fig. 30). Head: about 1.0 mm. Siphon: 1.9-2.2 mm; index 16.0-19.0. Anal Saddle: 0.32-0.34 mm. As figured; diagnostic characters as in

key. **Head:** Width about 1.1 of length. Hair 4-C usually double; 5-C usually triple (3-5); hair 9-C usually with 5 branches (4-7); hair 14-C double; 15-C with 3,4 branches. Mental plate with a strong median tooth and 9-11 distinct teeth on either side. **Antenna:** Length about 0.5 of head, distinctly spiculose to hair 1-A; all hairs single except 1-A (11,8-15). **Thorax:** Hair 0-P moderately long, weakly stellate, with 8-15 branches; 1,2-P long, single; 3-P moderately long, usually double (1-4); hair 4-P usually double (1-3); hairs 5-7-P single; 14-P small, single; 4-M double. **Abdomen:** Hairs 6,7-I, 6-II-V long, double; 6-VI single; 1-V moderately long, barely reaching apex of segment, with 3-5 branches. **Segment VIII:** Comb scales in a patch of 4,5 irregular rows, about 49-73 in number; individual scale with spatulate fringed apex. **Siphon:** Integument moderately pigmented, darker basally, with fine wartlike spicules. Subventral hairs (1,1a-S) 5 pairs, usually single, progressively smaller distad; subdorsal hairs (2a-S) 5 pairs, median ones usually unpaired. Pecten extending barely to proximal 0.2; individual tooth long, pointed apically, without lateral denticles. **Anal Segment:** Integument moderately pigmented, imbricate, spiculose. Hair 1-X short, weakly branched; 2,3-X long, single. Gills short, subequal to length of saddle, attenuated apically; ventral slightly shorter than dorsal.

SYSTEMATICS. *Culex restrictor* can be readily distinguished from other members of *Anoedioporpa* in the **adults** by the presence of acrostichal bristles extending from anterior margin to prescutellar area of mesonotum; in the **male genitalia** by the short distal division of subapical lobe with 4 apical leaves in addition to other specialized setae; in the **pupa** by hair 10-C strongly developed, single or double and distinctly longer than 11-C; and in the **larva** by: (1) ventral brush (4-X) with 6 pairs of hairs, (2) siphon with both subdorsal (2a-S) and subventral hairs (1,1a-S) composed of 5 pairs, and (3) hair 2-VIII on a sclerotized plate.

We have examined material of *restrictor* from Mexico, Guatemala, El Salvador, Costa Rica, Panama and Venezuela, and have not come across any significant variations between populations. The characters that separate *restrictor* from the members of Conservator Group are constant.

BIONOMICS. The immature stages of *restrictor* are usually found in treeholes (31 collections), and occasionally in cut bamboo internodes (2 lots) or artifical containers (tires in 2 lots, gallon can in 1 lot). They have been collected at low (10 m) to moderately high (1700 m) elevations. The immatures have been collected in association with many typically treehole-breeding mosquitoes, including 10 different species of *Aedes (Protomacleaya), Culex (Culex) declarator* Dyar & Knab 1906, *Cx. (Cux.) mollis* Dyar & Knab 1906, *Corethrella appendiculata* Grabham 1906, *Haemagogus (Haemagogus) equinus* Theobald 1903, *Hg. (Hag.) lucifer* (Howard, Dyar & Knab 1913), *Hg. (Hag.) mesodentatus* Komp & Kumm 1938, *Orthopodomyia kummi* Edwards 1939 and *Toxorhynchites (Lynchiella) moctezuma* (Dyar & Knab 1906). Nothing is known about the behavior of the adult females.

DISTRIBUTION (fig. 27). *Culex restrictor* is primarily Central American in distribution. We have seen specimens from Mexico as far north as the states of Jalisco (Pacific side) and San Luis Potosi (Atlantic side), from Guatemala, El Salvador, Honduras, Costa Rica and Panama. It has also been collected from Venezuela, from 2 adjacent localities just N of Maracay.

Material examined: 973 specimens; 121 males, 124 females, 262 pupae, 466 larvae; 148 individual rearings (98 larval, 40 pupal, 10 incomplete).

COSTA RICA. **Alajuela:** Alajuela, 880 m, 18 July 1971, D.W. Heinemann, 7L (CR 270) [UCLA]; no data [FH, 8931]. Desamparados, Rio Machuca, 260 m, 1 Nov 1971, D. Schroeder, 1 lpM (CR 497-11), 4 lpF (497-12-15), 3 pM (497-100-102), 6L (497) [UCLA]. Desmonte, 600 m, 2

Aug 1971, A. Berrios A., 1L (CR 330) [UCLA]. **Cartago**: Orosi, 1070 m, 19 July 1971, J.N. Belkin, 2 lpM (CR 280-10,-11), 2 lpF (280-12,-13) [UCLA]. **Guanacaste**: Puerto Humo, Palo Verde OTS Field Station, 10 m, 18 Aug 1971, S.J. and D.W. Heinemann, 1 pM (CR 443-102), 2 pF (443-100,-101), 10L (443), 1 lpF (CR 444-11), 2 lP (444-10,-12), 8L (444); 19 Aug 1971, D.W. Heinemann, 2 lpM (CR 449-10,-11), 5 lpF (449-12-14,-16,-18), 3 pM (449-100-102), 2 lP (449-15,-17), 20L (449); 20 Aug 1971, D.W. Heinemann, 6 lpM (CR 452-21-23,-25-27), 8 lpF (452-20,-24,-28-33), 4 pM (452-100,-101,-103,-109), 3 pF (452-102,-107,-108), 1L (452) [UCLA]. **Puntarenas**: El Roble, 16 June 1943, T.H.G. Aitken, 1F (KO 207B-12) [UCLA]. **San Jose**: Limonal, 1080 m, 4 Aug 1971, D. Schroeder and S.J. Heinemann, 2 lpM (CR 335-10,-11), 2 lpF (335-14,-16), 2 pF (335-100,-101), 3L (335) [UCLA]. San Isidro del General, 750 m, 20 June 1964, C.L. Hogue, 1 pF (CR 176-102), 1P (176) [UCLA].

EL SALVADOR. **Sonsonate**: Izalco, 430 m, 6 Nov 1971, J.N. Belkin and S.G. Breeland, 1 lpF (SAL 53-50) [UCLA]. Los Planes, det. W. Kumm [FH, 4271,6310]. Sonsonate, Finca San Dionisio,4 Aug 1964, A. Quinonez, 1 lpF (SAL 8-20), 1 pF (8-101), 3L (8) [UCLA]. Sonsonate, Canton El Castano, 300 m, 1 Aug 1964, A. Quinonez, 1 lpF (SAL 1-20), 1L (1), 1 lpM (SAL 3-11), 3 lpF (3-13-15), 1P, 24L (3) [UCLA]. **Usulutan**: San Juan del Gozo, H.W. Kumm, 3M, 2F (KO 207A-28) [UCLA].

GUATEMALA. **Chimaltenango**: Locality unspecified, Jun-Oct 1950, H.T. Dalmat, 4 lpF (GUA 151-23,-24,-26,-28), 8M (151-10,-11,-13,-14,-19,-22,-29,-31), 11F (151-12,-15-18,-20,-25,-27,-30,-32,-33), 4P (151) [UCLA]. **Escuintla**: Escuintla, 160-180 m, 10 July 1964, J. and T. Zavortink, 6 lpF (GUA 39-10,-11,-13,-14,-16,-18), 1 lp (39-17), 3 pM (39-101-103), 4 pF (39-105-108), 2 lP (39-12,-15), 3M, 3F, 11P, 7L (39), 3 lpM (GUA 40-20-22) [UCLA]. San Jose de Guatemala [=Puerto de San Jose], 16 July 1943, D.G. Hall, 2M (KO 41-2); July1943, D.G. Hall, 2F (KO37-26,-39), 2M (GUAK 27) [UCLA]. **Guatemala**: Bethania, Rio El Naranjo, 1500 m, 15 July 1964, T. Zavortink and P. Cowsill, 2 lpF (GUA 44-10,-11), 1 lP (44-12), 2L (44) [UCLA]. Guatemala City, 1500 m, 2 Sept 1964, W. Almengor and P. Cowsill, 2L (GUA 118) [UCLA]. Villa Canales, 1300 m, 22 July 1964, W. Almengor and P. Cowsill, 1L (GUA 60) [UCLA]. **Retalhuleu**: San Felipe, 580 m, 2 July 1964, P. Cowsill, 6 lpF (GUA 22-20,-22-26), 1 lF (22-21), 6F, 6P, 6L (22) [UCLA].

HONDURAS. **Atlantida**: Lancetilla, 50 m, 19 Aug 1964, A. Quononez, 1L (HON 55-10) [UCLA].

MEXICO. **Guerrero**: Chilpancingo, 34 km S of, ?900 m, 7 Aug 1966, D. Schroeder, 1L (MEX 424), 2L (MEX 426); 38 km S of Chilpancingo, ?700 m, 8 Aug 1966, D. Schroeder, 6L (MEX 420) [UCLA]. **Jalisco**: El Tuito, 19 km N of Boca de Tomatlan, 610 m, 30 Aug 1972, J.N. Belkin, 16 lpM (MEX 722-10-15,-19,-22,-24-29,-80,-81), 8 lpF (722-16-18,-20,-21,-23,-82,-83), 1 pM (722-101), 2 pF (722-102,-103), 48M, 16F, 80P, 172L (722) [UCLA]. Quililla, El Mirador, 1700 m, 8 June 1971, L.T. Nielsen and T. Zavortink, 4 lpF (MEX 671-30-33) [UCLA]. **Oaxaca**: Almoloya, 21 July 1905, F. Knab, 1 lP (311c) [USNM, holotype of *restrictor*]. Salina Cruz, ?10 m, 9 Aug 1966, D. Verity, 1P (MEX 105-10), 2L (105) [UCLA]. Tehuantepec, Puentes Tortugas, 100 m, 16 Aug 1966, D. Schroeder, 1 pM (MEX 436-100), 1 lP (436-10), 12L (436), 2 lpM (MEX 437-10,-11), 1L (437) [UCLA]. **San Luis Potosi**: Tamazunchale, 200 m, 20 July 1965, R.X. Schick and D. Schroeder, 1 lpM (MEX 213-21), 1 lpF (213-90), 1M (213-20), 27L (213); 21 July 1965, R.X. Schick and D. Schroeder, 1L (MEX 233) [UCLA]. **Veracruz**: Cordoba, 900 m, 18 July 1964, E. Fisher, 1L (MEX 52); 22 July 1964, E. Fisher and D. Verity, 1L (MEX 70) [UCLA]; 7 Mar 1908, F. Knab, 1M (429.1) [USNM, 11969; lectotype of *consternator*].

PANAMA. **Bocas del Toro**: Highlands of Chiriqui above 1000 m (Galindo and Blanton 1955: 73). **Canal Zone**: Corozal Dam, 28 July 1943, 1F (KO 41-21) [UCLA]. **Cocle**: El Valle, 600 m, 13 Aug 1963, A. Quinonez, 1 pM (PA 507-101) [UCLA]. **Darien**: Pucro, northern slopes of Cerro Mali, 1470 m, 27 May 1963, A. Quinonez, 1 lp (PA 366-107) [UCLA].

VENEZUELA. **Aragua**: Guamitas, 740 m, 15 July 1969, J. Bergland and T. Zavortink, 2 lpF (VZ 198-30,-32), 1 pM (198-102), 4 pF (198-100,-101,-103,-104), 1 lp (198-31), 12P, 16L (198); 18 Aug 1969, J. Clavijo and J. Pulido, 3L (VZ 374) [UCLA]. El Castano, 600 m, 20 Aug 1969, J. Clavijo and J. Pulido, 9L (VZ 380) [UCLA].

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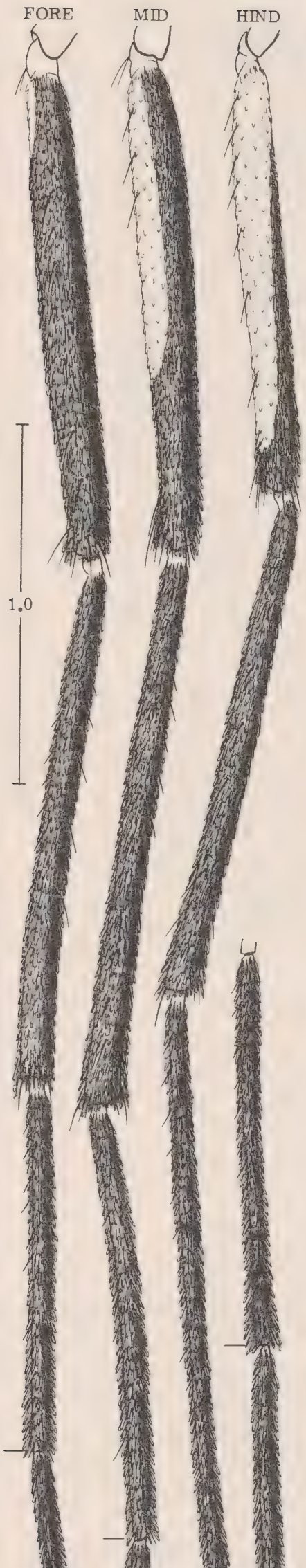
Fig. 1


AEDINUS
amazonensis
accelerans
guyanensis
clastrieri
MIDDLE AMERICA
KILOMETERS
0 50 100 500 1000 1500
0 50 100 500 1000
STATUTE MILES
MOSQUITOES OF MIDDLE AMERICA
UCLA-ZOOLOGY-ENT-1965-2

Fig. 2

AEDINUS



amazonensis

TR 353
Nariva Swamp
Nariva
Trinidad

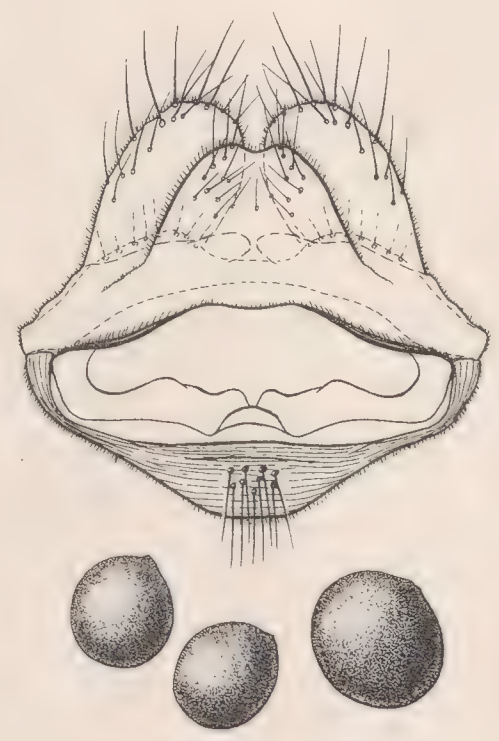


Fig. 3

AEDINUS

SUR 226-100
Onverwacht
Suriname
Surinam

C

1.0

I
II
III
IV
V
VI
VII
VIII
IX

♂

P

NM

subapical lobe

TR 350-126
Trinidad

TR 351-127
Trinidad

0.3

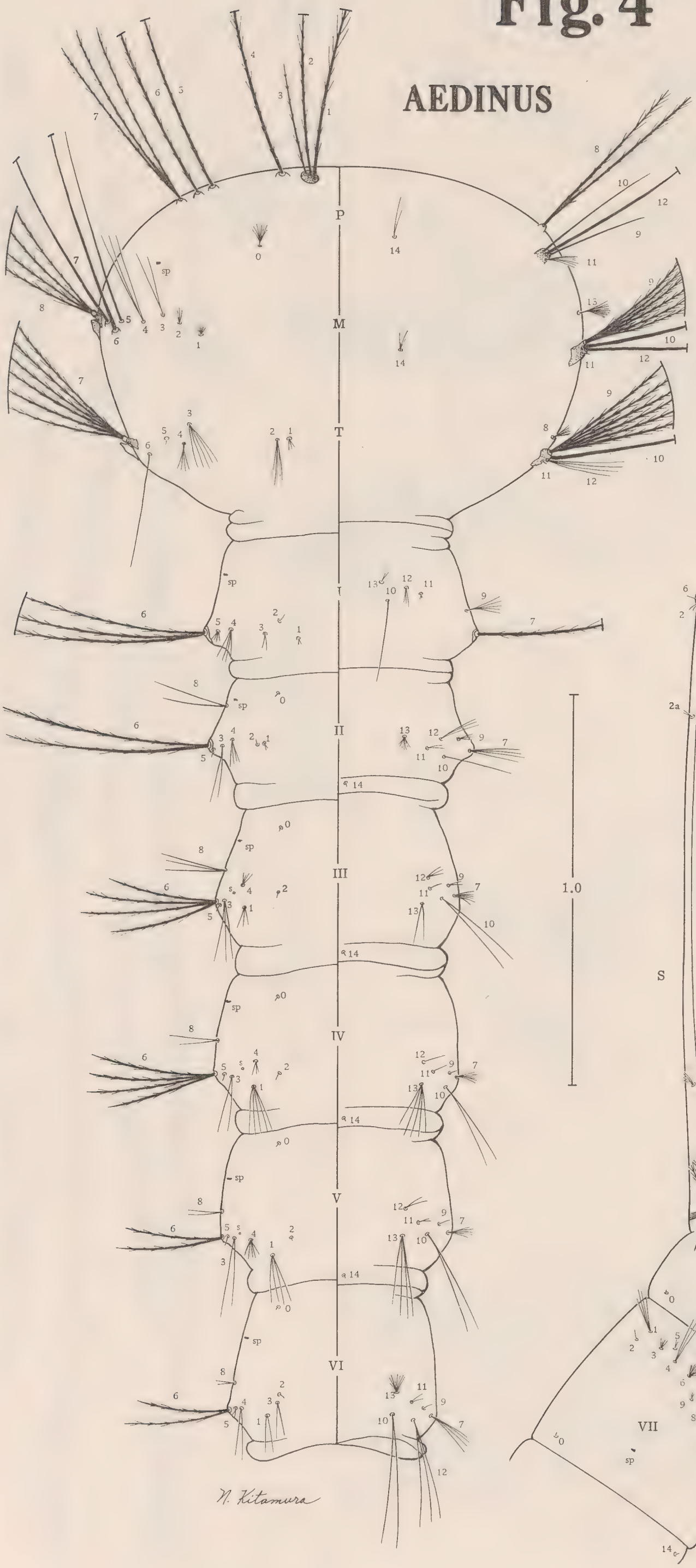
lateral plate

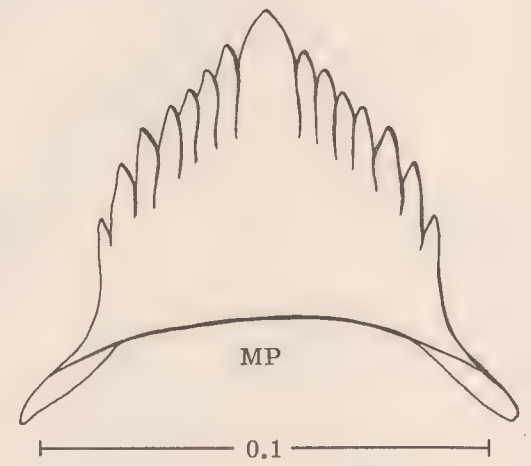
amazonensis

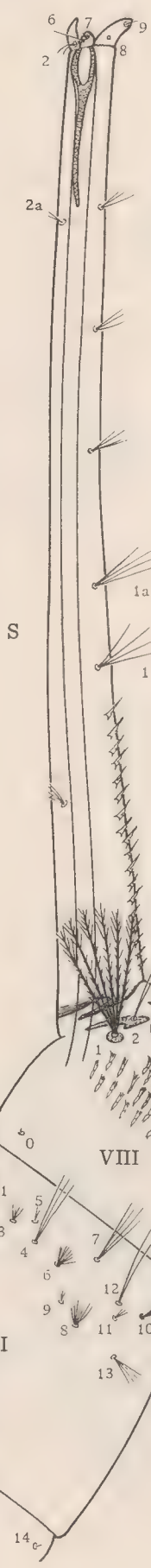
N. Kitamura

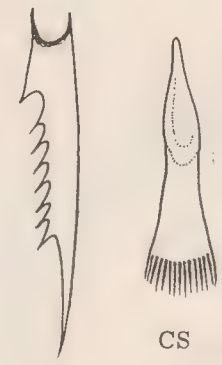
Fig. 4

AEDINUS









amazonensis

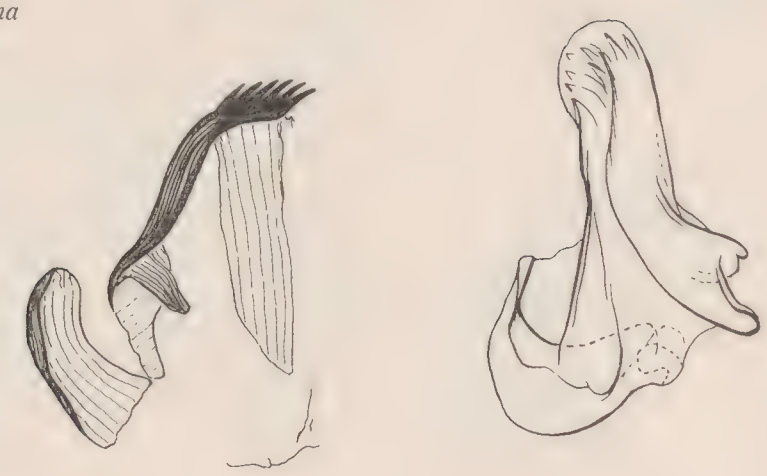
TR 22
Nariva Swamp
Nariva
Trinidad

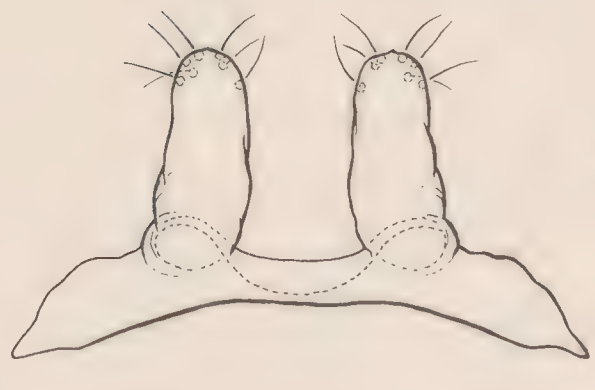
Fig. 5

AEDINUS

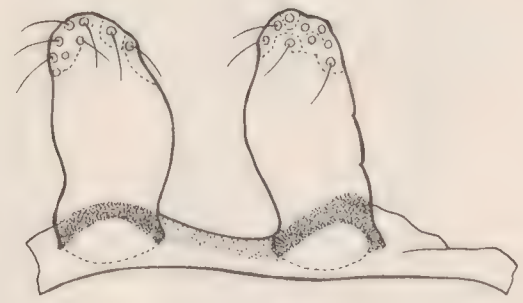
clastrieri

FG 43
Raban
Cayanne
French Guiana





guyanensis



after J. Clastrier, 1970

Fig. 6

AEDINUS

GUY 39-101
George Town
Guyana

FG 126
Remire
Guyane
French Guiana

subapical lobe

lateral plate

accelerans

N. Kitamura

1.0

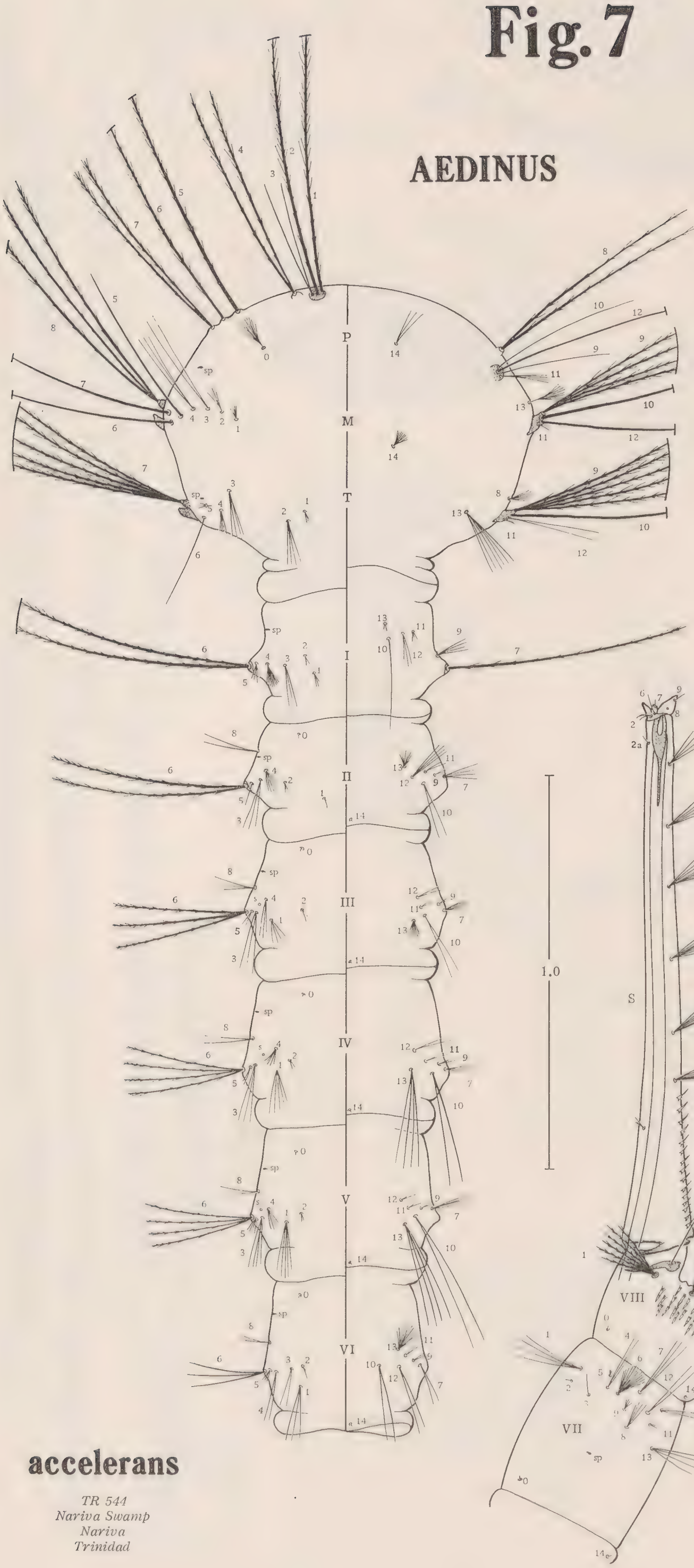
0.3

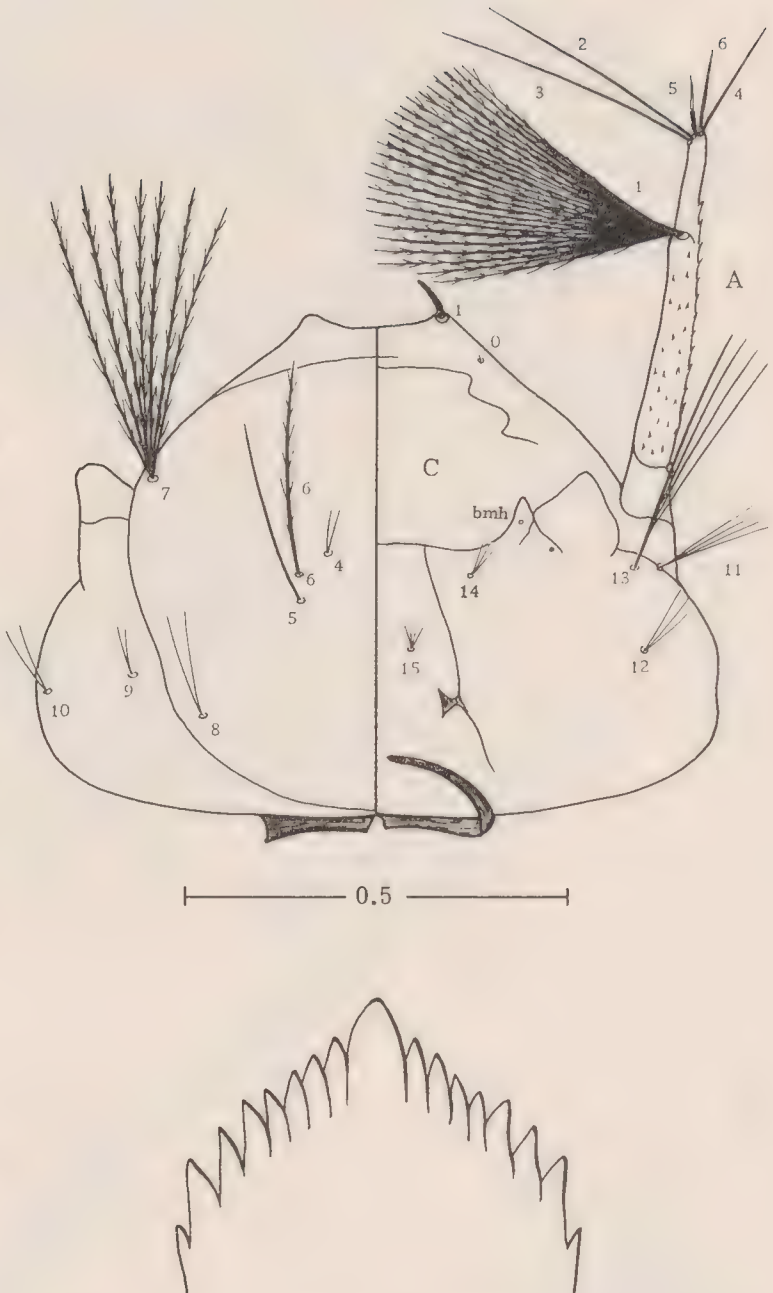
P

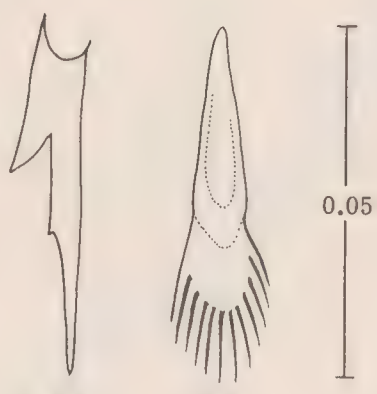
NM

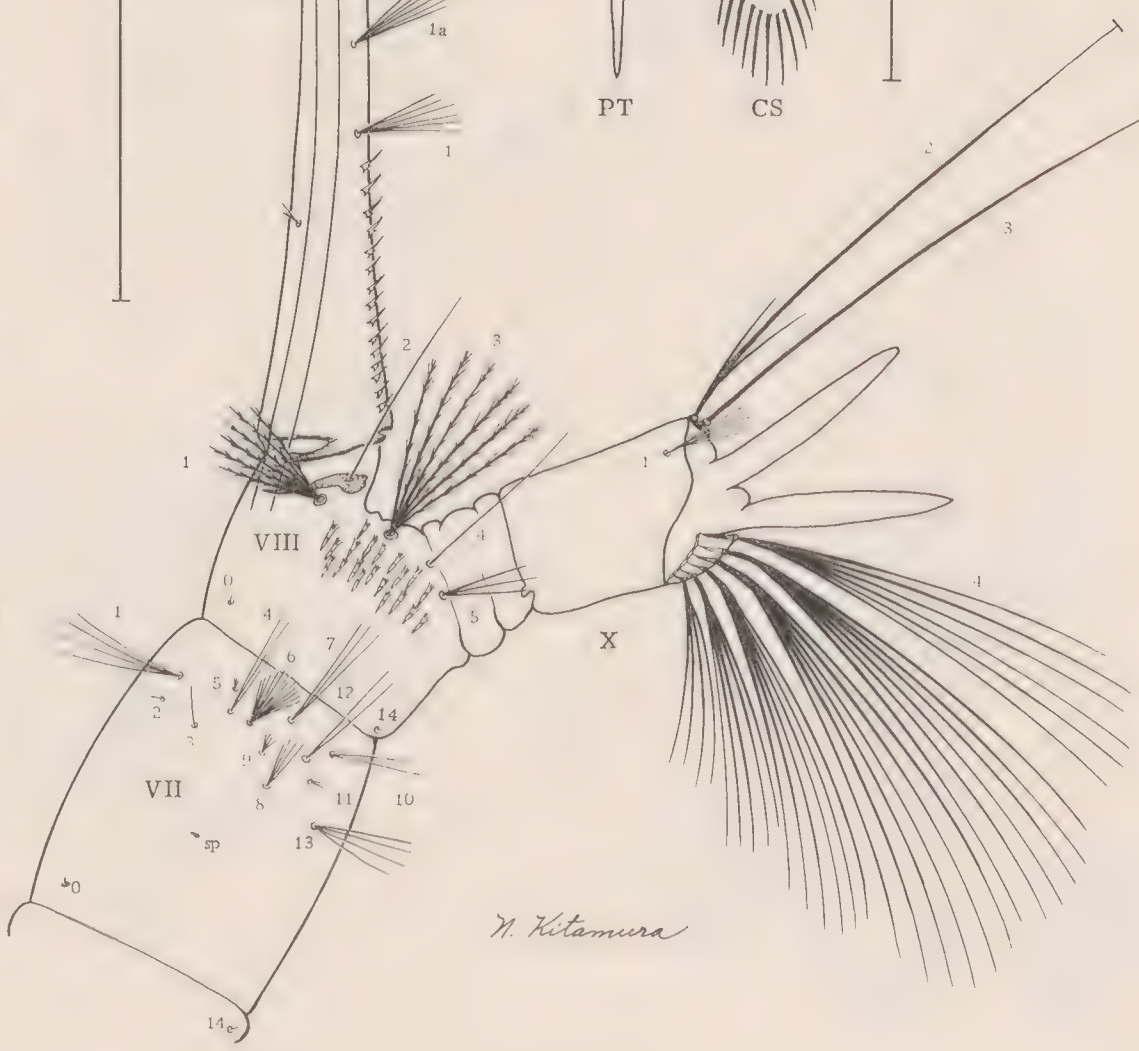
Fig. 7

AEDINUS









N. Kitamura

accelerans

TR 544
Nariva Swamp
Nariva
Trinidad


Fig. 8
TINOLESTES
•latisquama
MIDDLE AMERICA
KILOMETERS
0 50 100 500 1000 1500
0 50 100 500 1000
STATUTE MILES
MOSQUITOES OF MIDDLE AMERICA
UCIA-ZOOLOGY-ENT-1965-2

Fig. 9

TINOLESTES

latisquama

PA 889
Rodman Naval Station
Canal Zone
Panama

FORE MID HIND

1.0

♀

♂

1.0

FORE MID HIND

0.1

FORE MID HIND

♀

♂

♀

0.3

Fig. 10

TINOLESTES

PA 275
Almirante
Bocas del Toro
Panama

1.0

0.3

subapical lobe

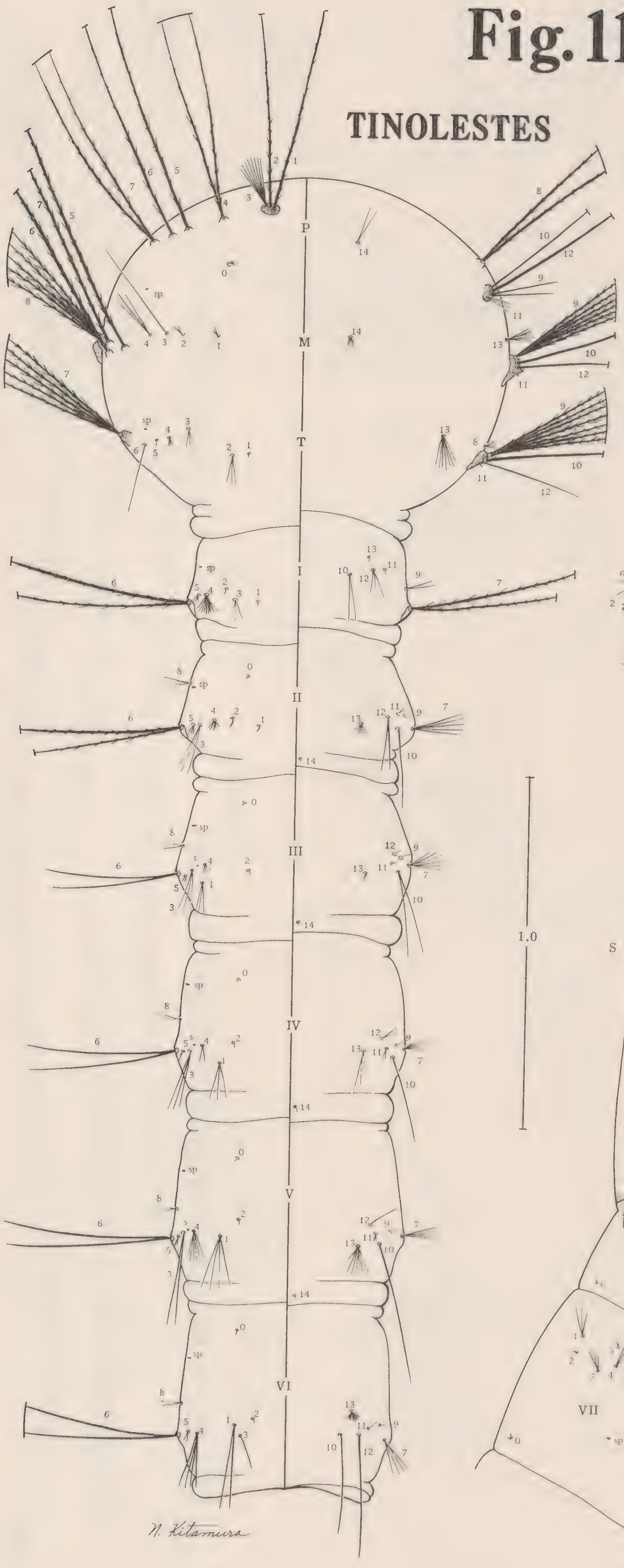
lateral plate

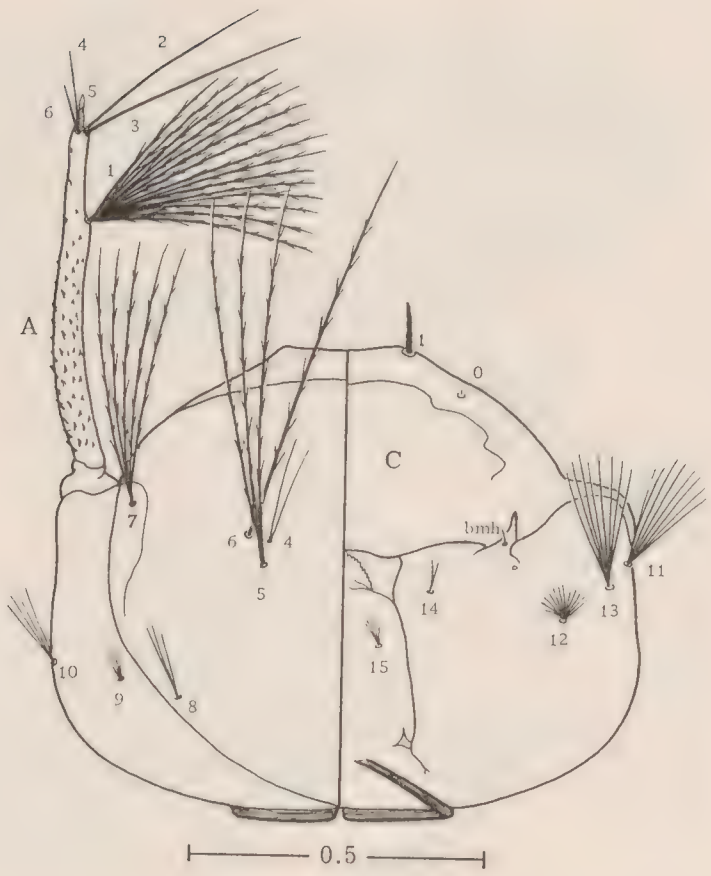
latisquama

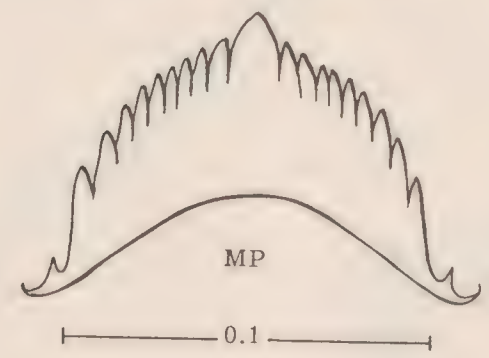
N. Kitamura

Fig. 11

TINOLESTES







latisquama

PA 573
Salud
Colon
Panama

Fig. 12

ANOEDIOPORPA

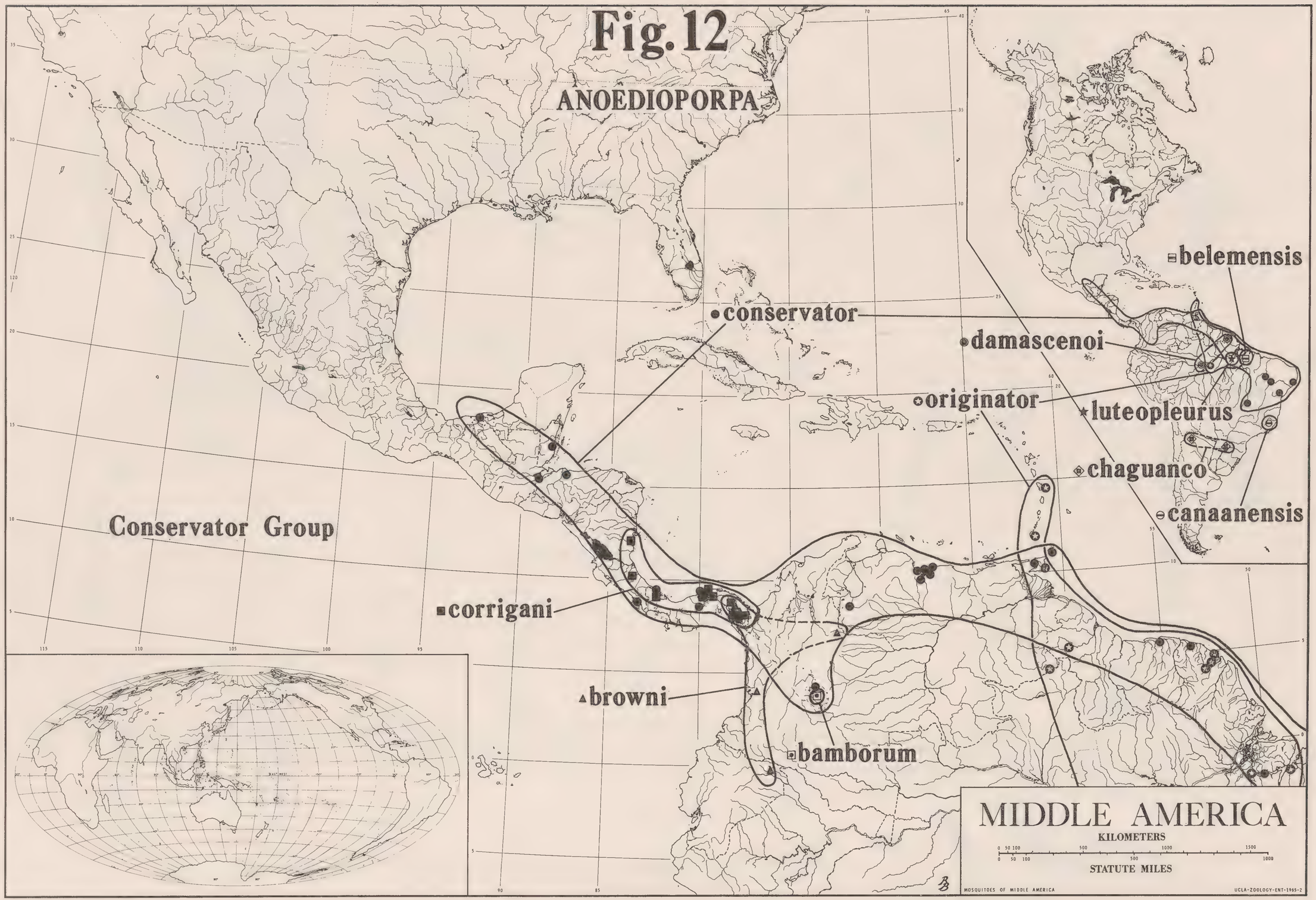
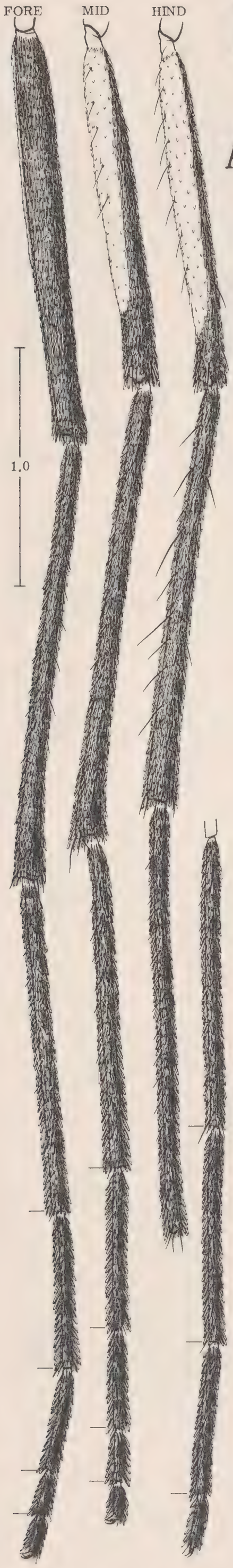


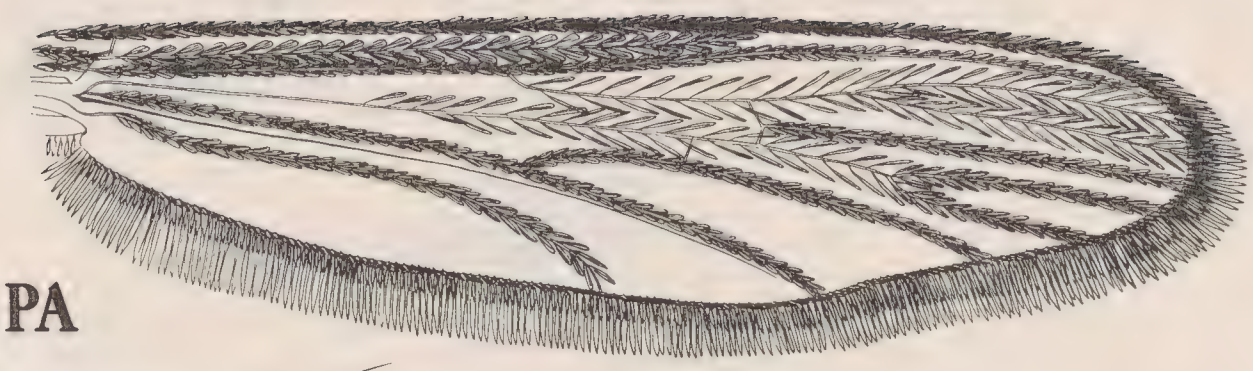
Fig. 13

ANOEDIOPORPA

conservator

TR 410
Monos Island
Trinidad





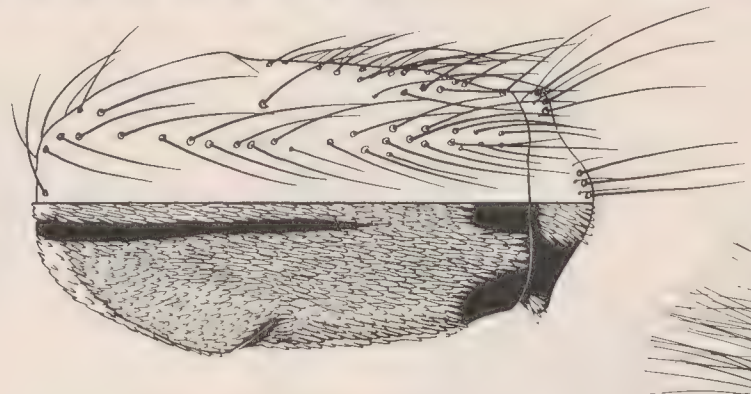
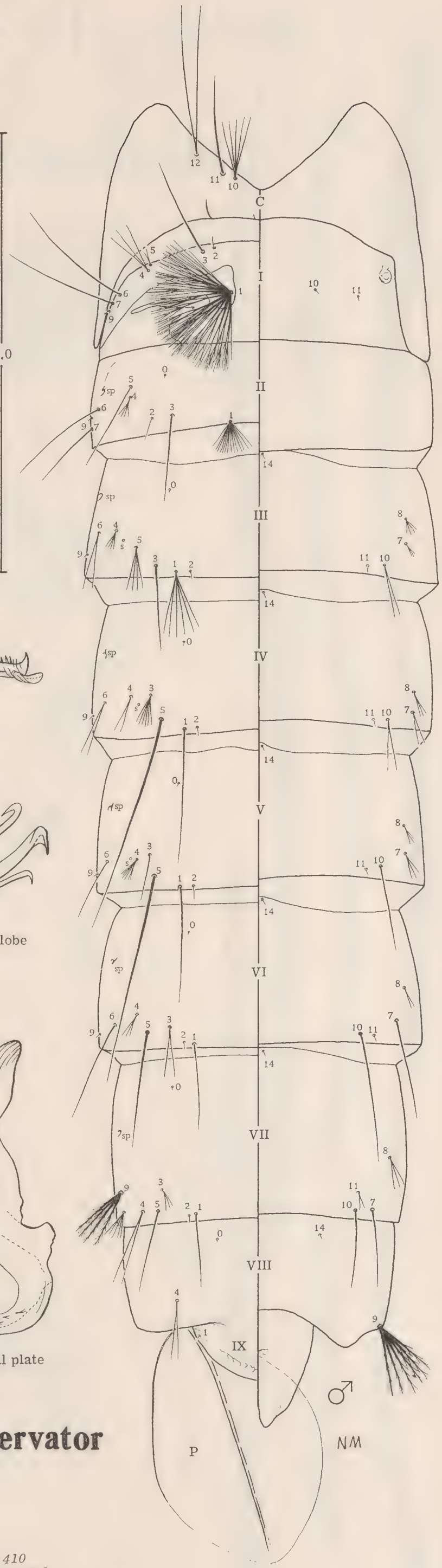


Fig. 14

ANOEDIOPORPA



conservator

TR 410
Monos Island
Trinidad

N. Kitamura

Fig. 15

ANOEDIOPORPA

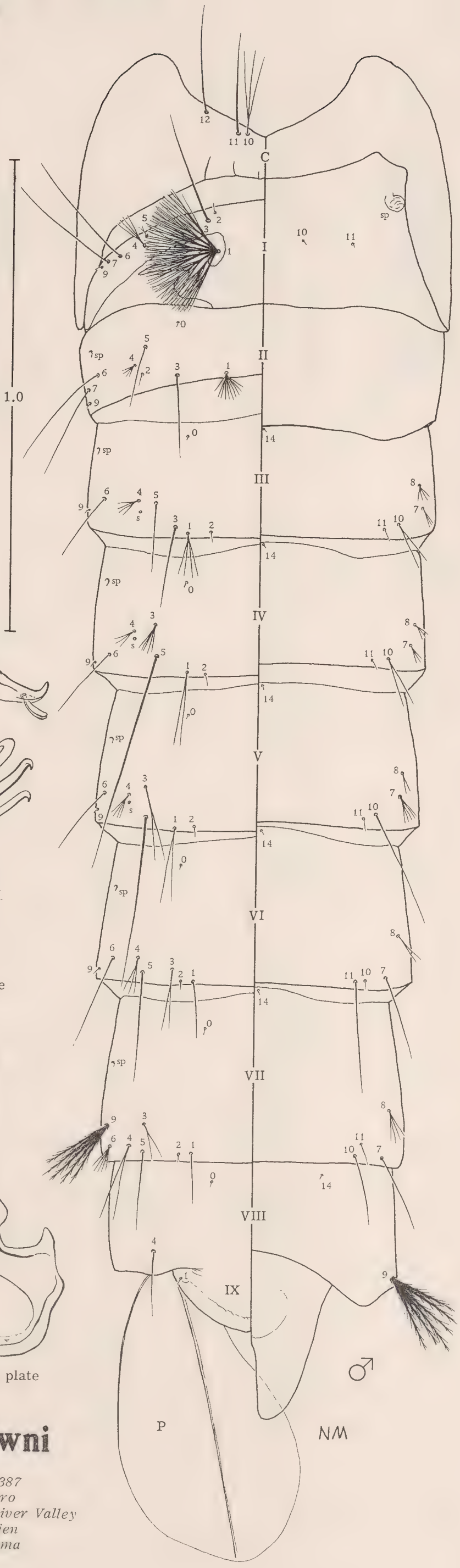
conservator

CR 130
Rincon
Osa Peninsula
Puntarenas
Costa Rica

N. Kitamura

Fig. 16

ANOEDIOPORPA

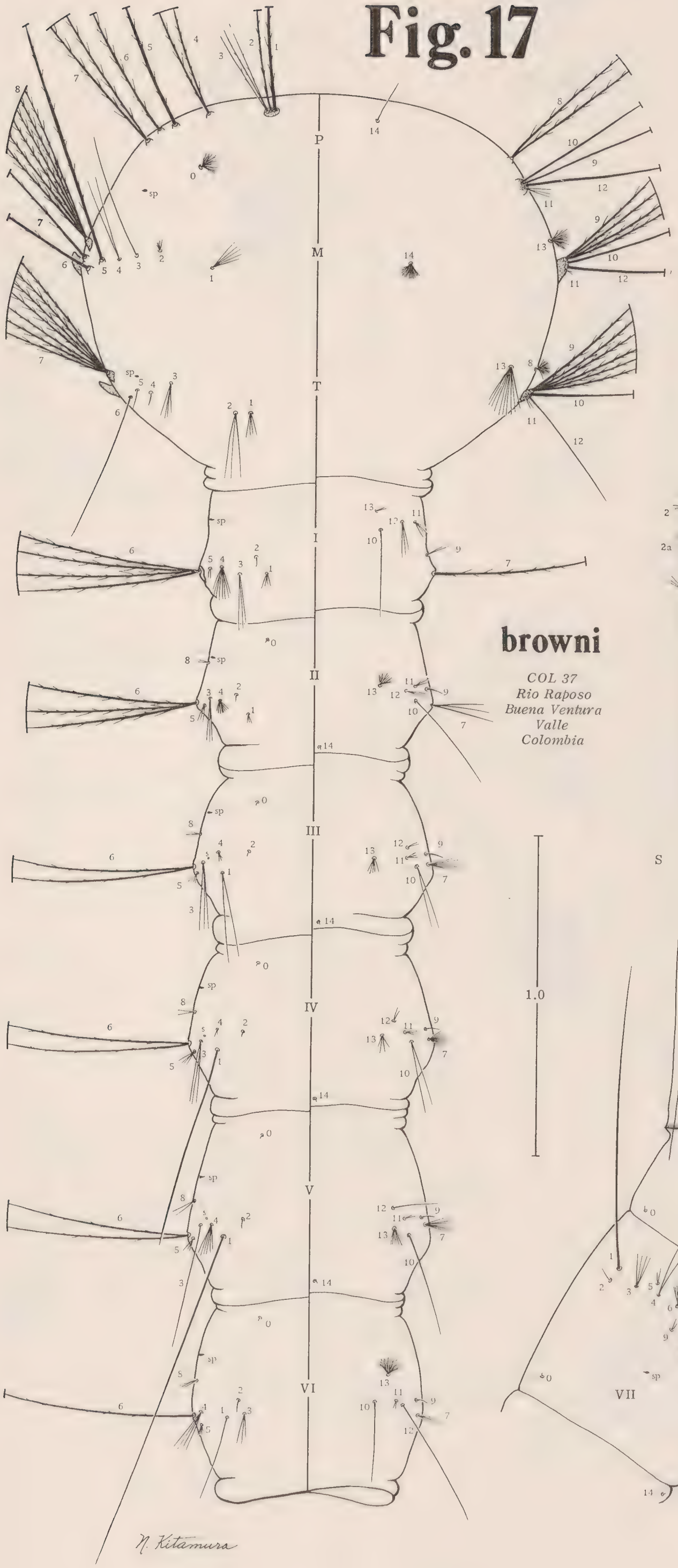


lateral plate

browni

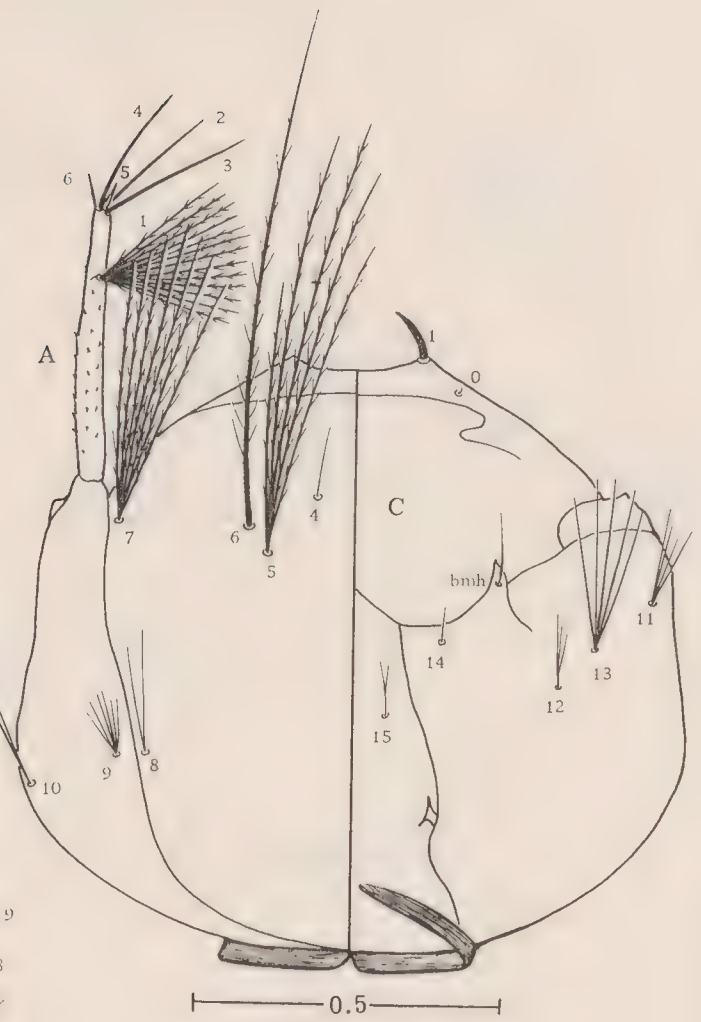
PA 387
Pucro
Tacarcuna River Valley
Darien
Panama

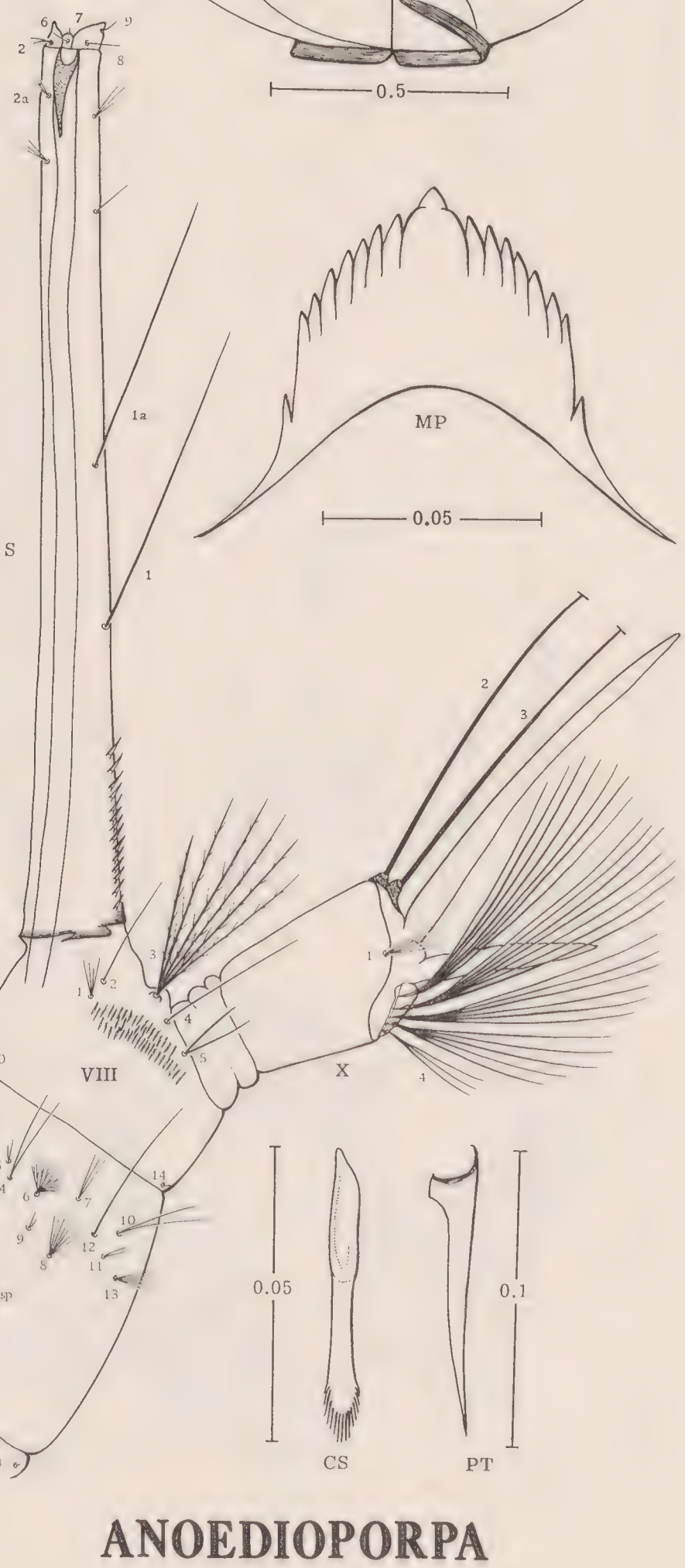
Fig. 17



browni

COL 37
Rio Raposo
Buena Ventura
Valle
Colombia





ANOEDIOPORPA

N. Kitamura

Fig. 18

ANOEDIOPORPA

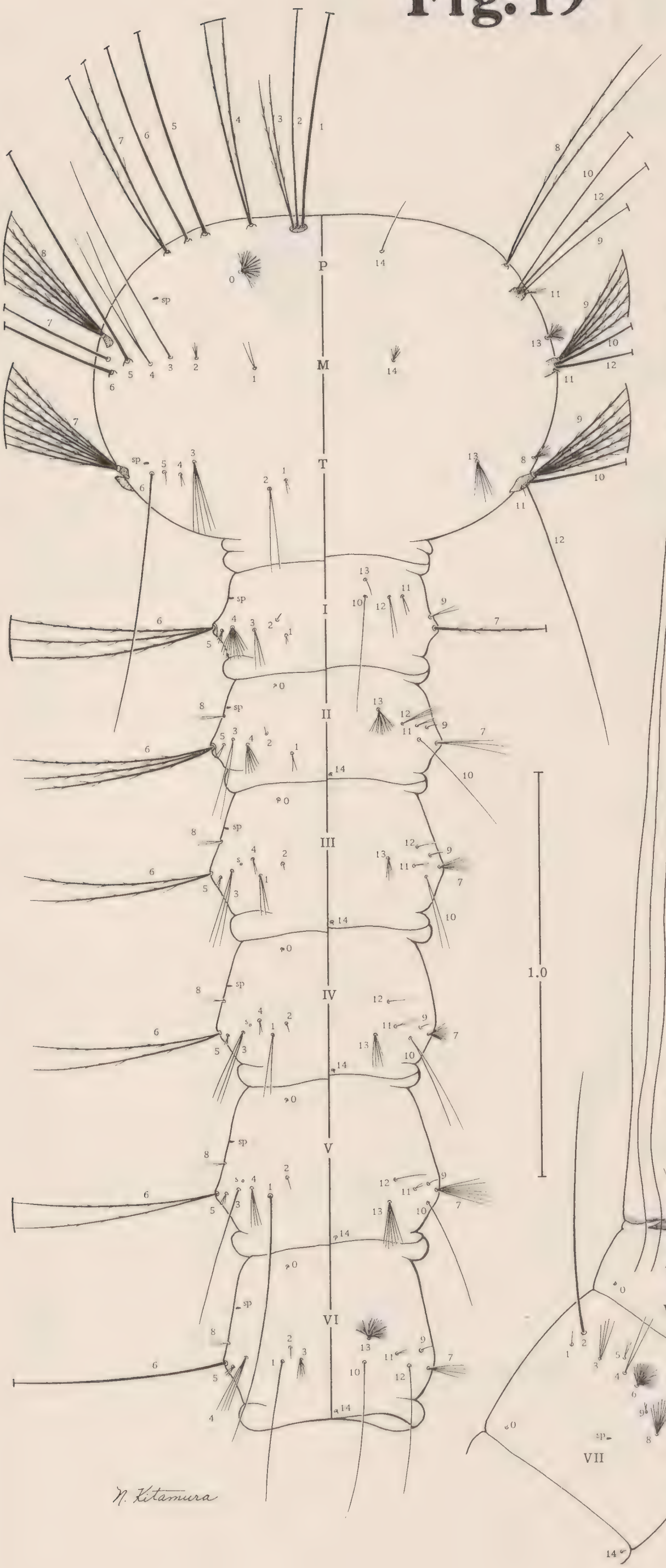
bamborum

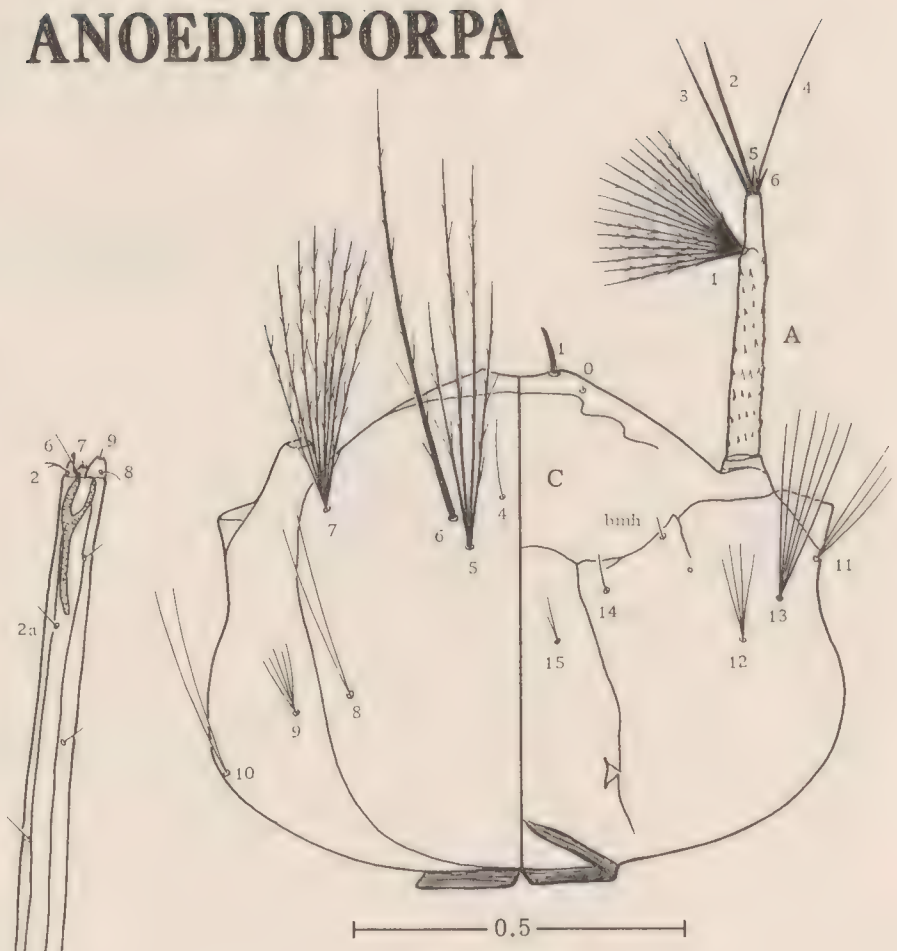
CV 73-1
Villavicencio
Meta
Colombia

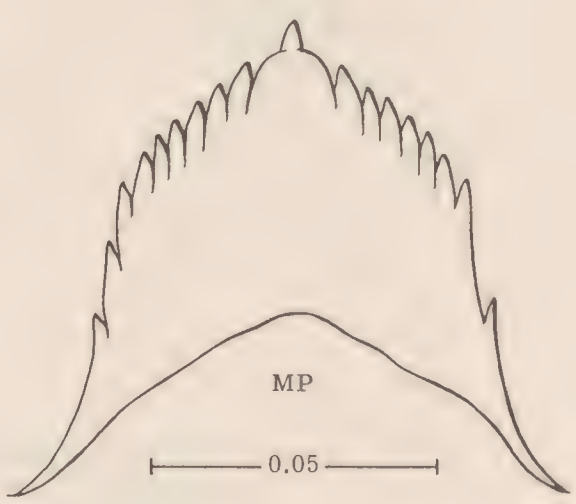
404-1 (USNM)
Acacias
Villavicencio
Meta
Colombia

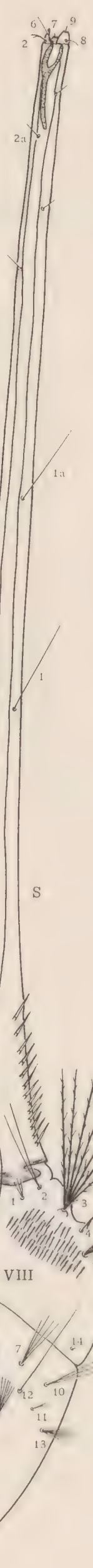
Fig. 19

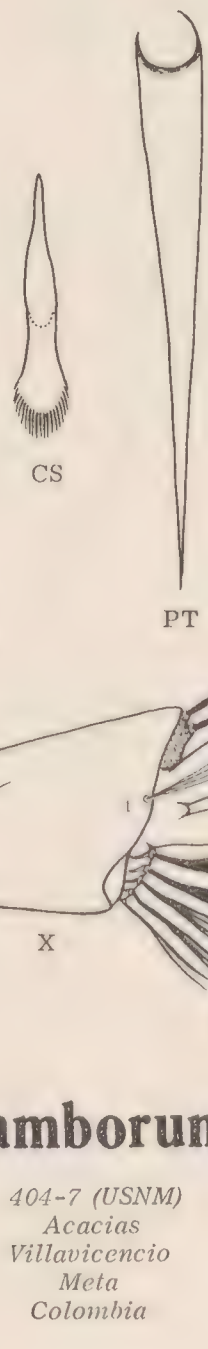
ANOEDIOPORPA

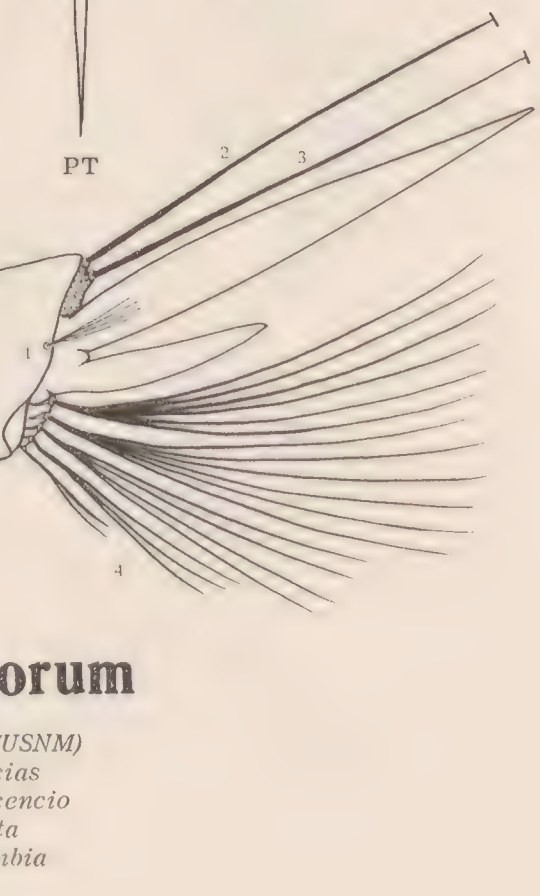












N. Kitamura

bamborum

404-7 (USNM)
Acacias
Villavicencio
Meta
Colombia

Fig. 20

ANOEDIOPORPA

ARG 610-10
Vespucio
San Martin
Salta
Argentina

1.0

0.3

subapical lobe

lateral plate

773-104
Vespucio
San Martin
Salta
Argentina

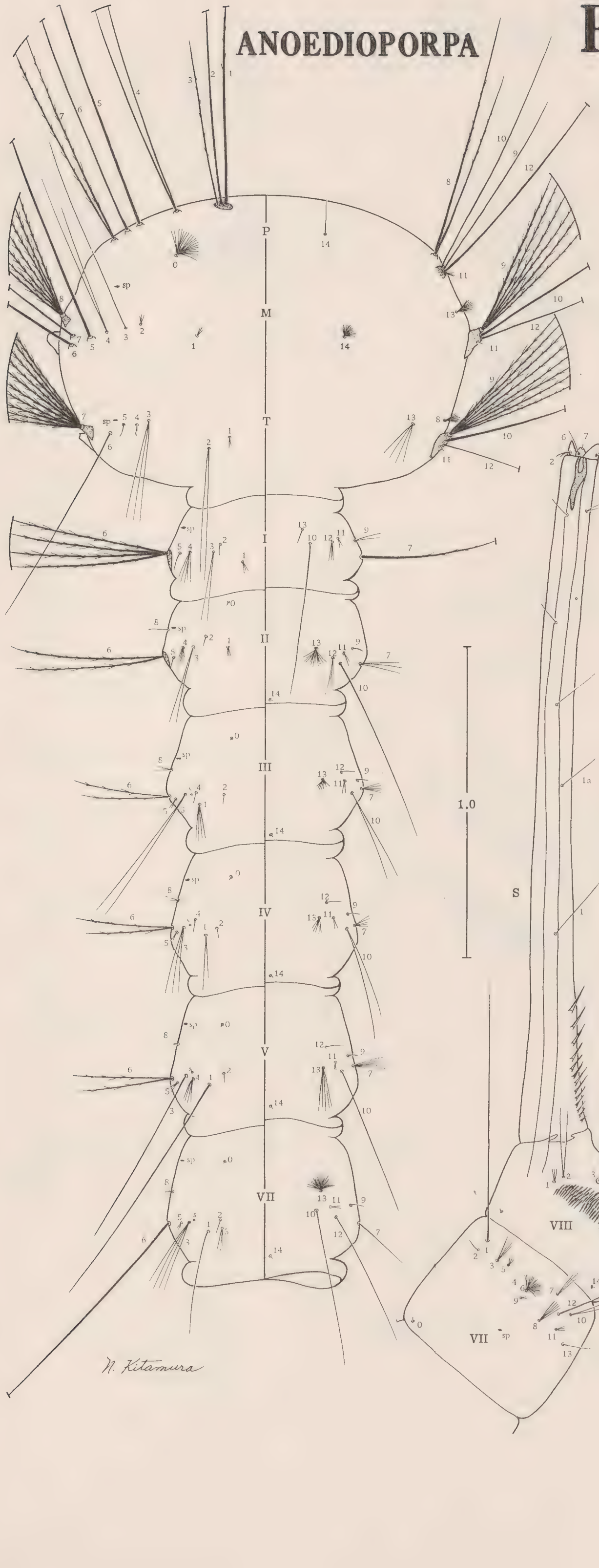
chaguanco

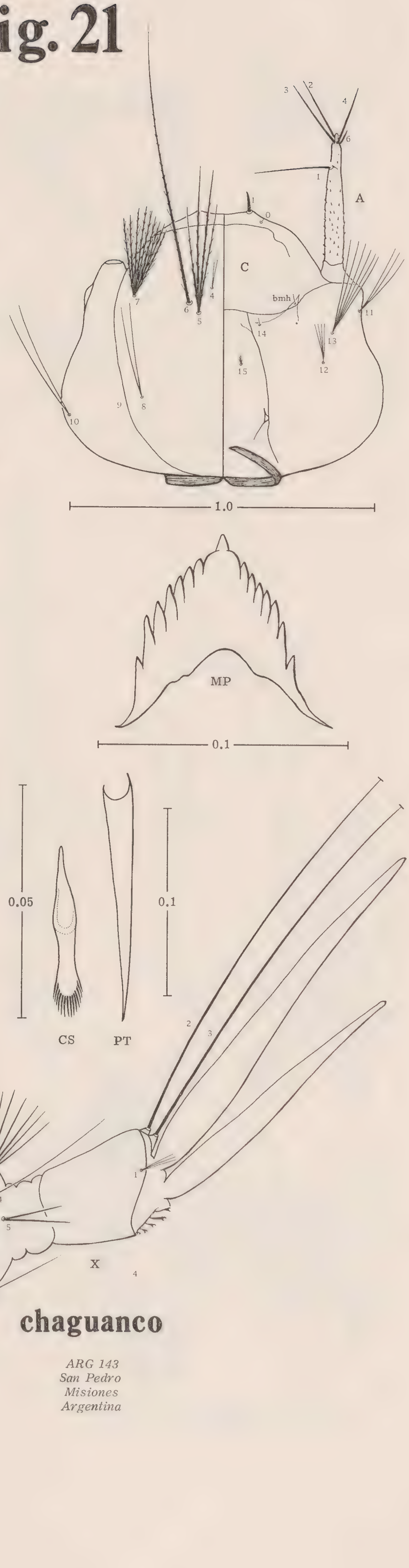
♂

NM

ANOEDIOPORPA

Fig. 21





N. Kitamura

chaguanco

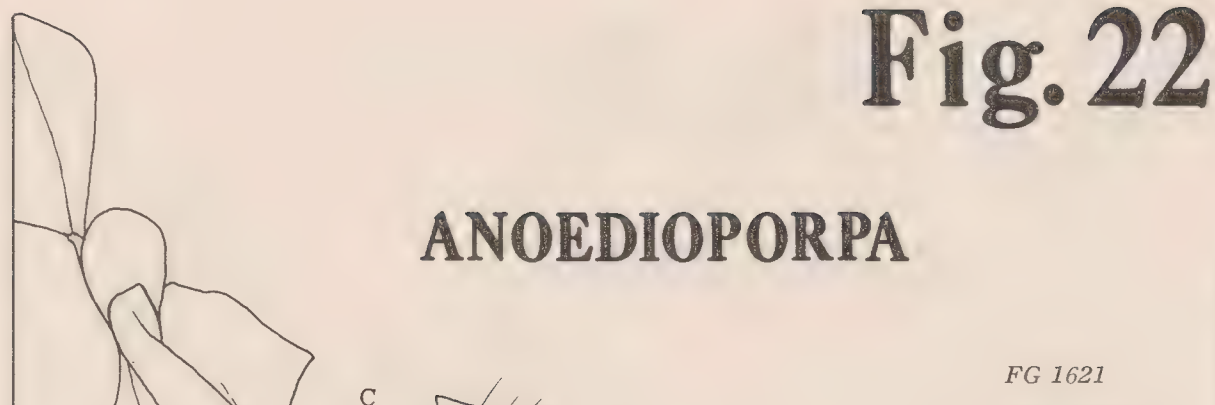
ARG 143
San Pedro
Misiones
Argentina

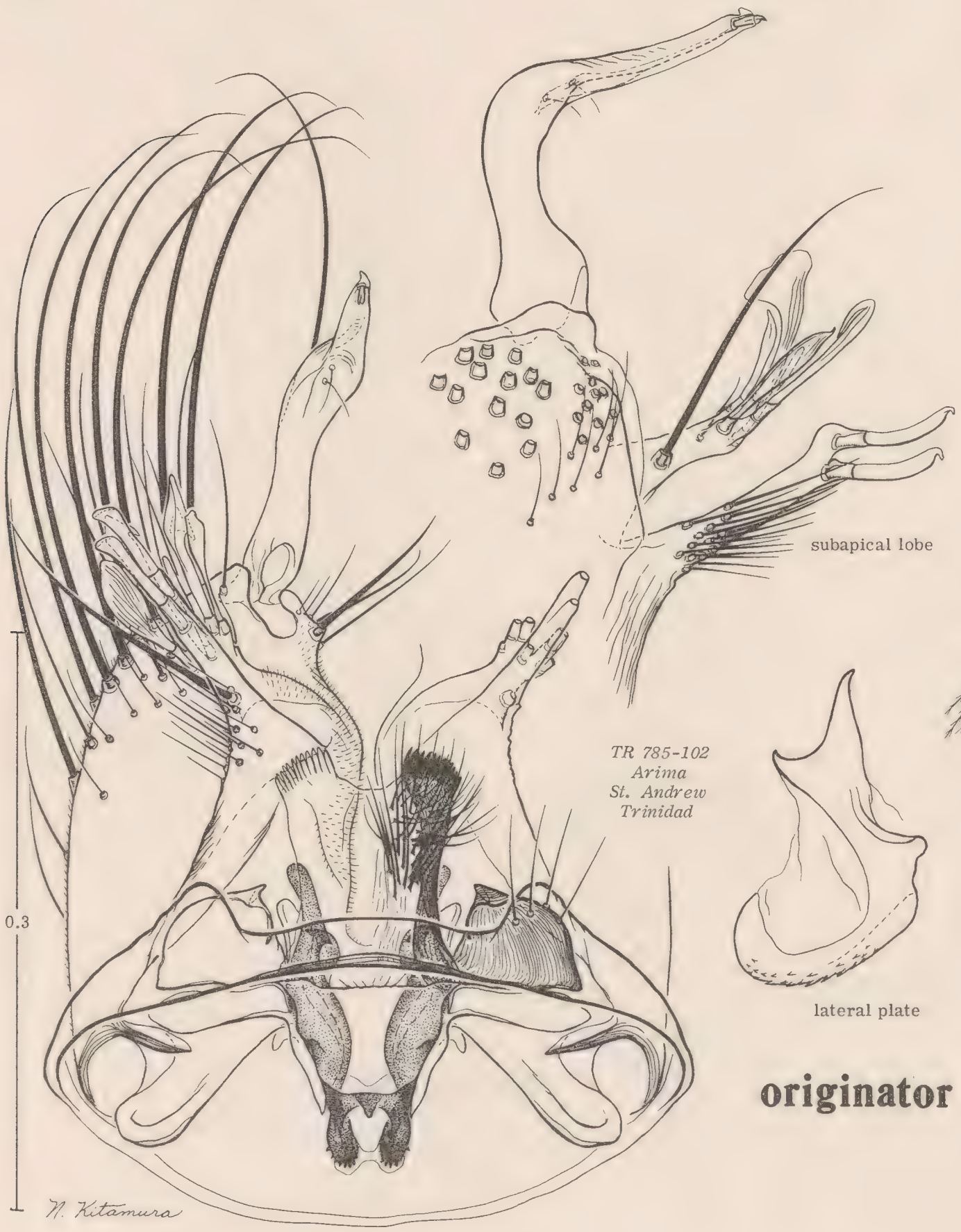
Fig. 22

ANOEDIOPORPA

FG 1621
FG 162-10
Raban
Cayanne
French Guiana

1.0





TR 785-102
Arima
St. Andrew
Trinidad

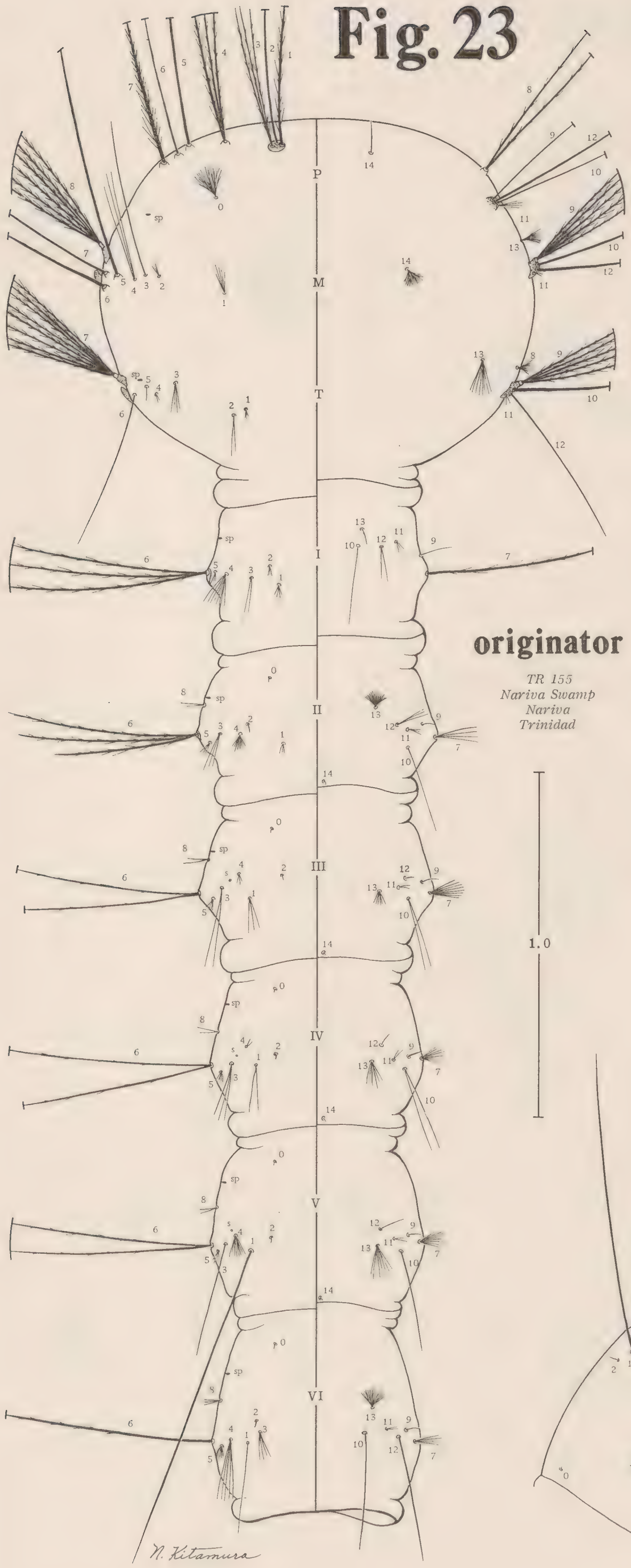
0.3

lateral plate

originator

N. Kitamura

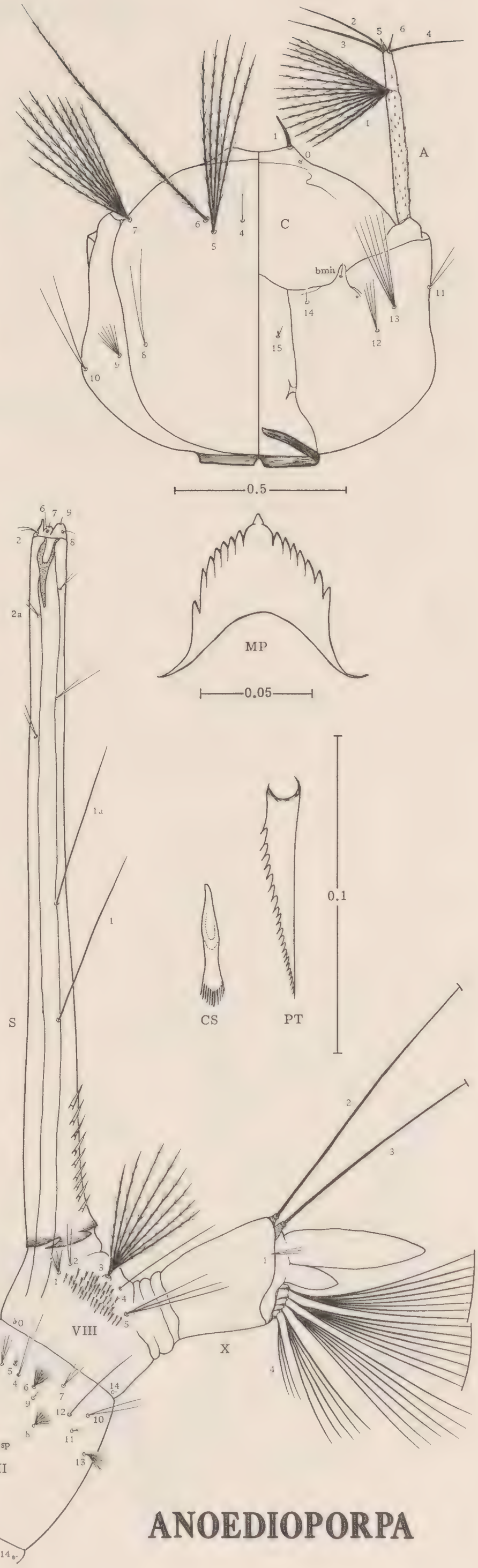
Fig. 23



originator

TR 155
Nariva Swamp
Nariva
Trinidad

1.0



ANOEDIOPORPA

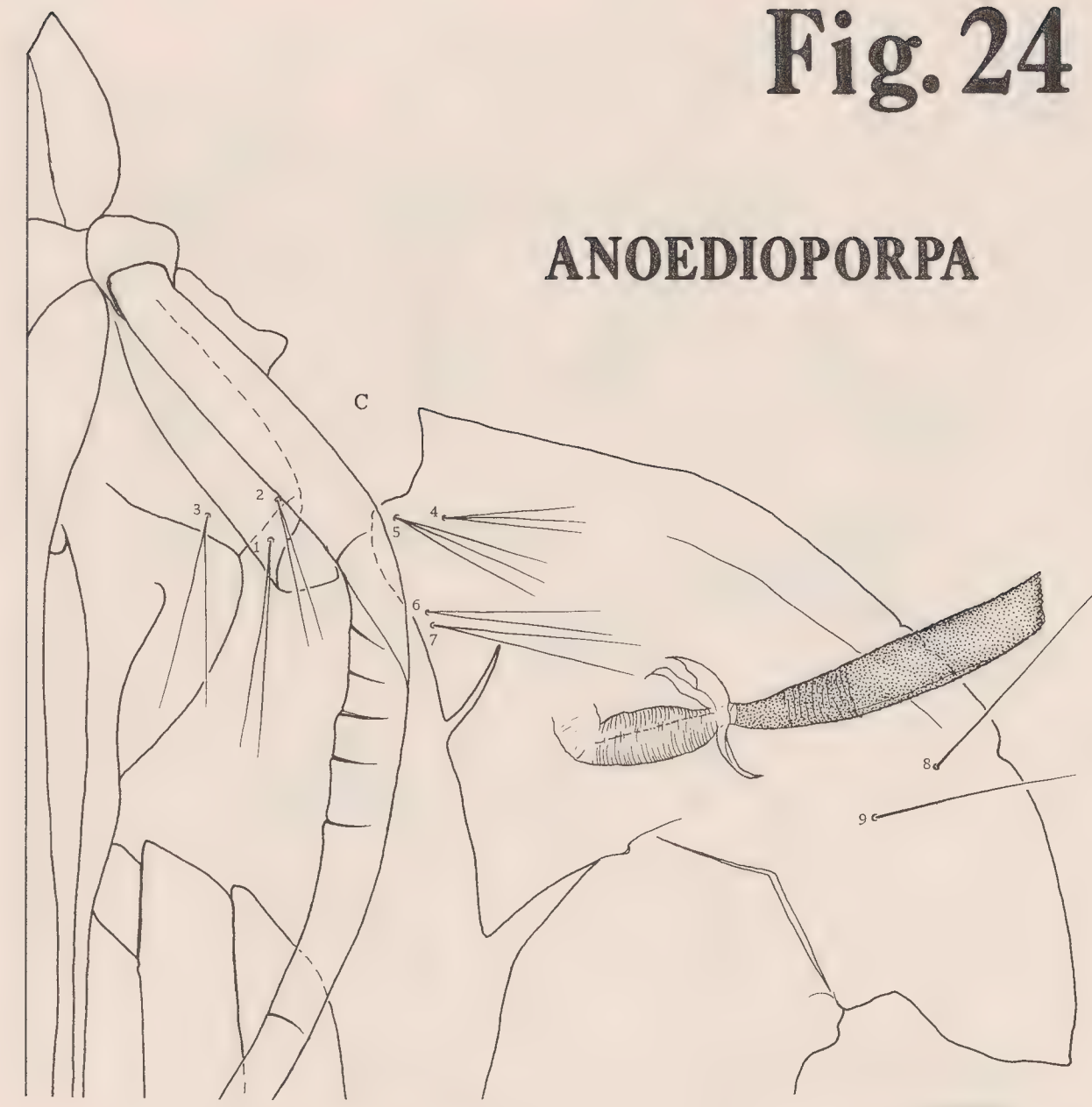
N. Kitamura

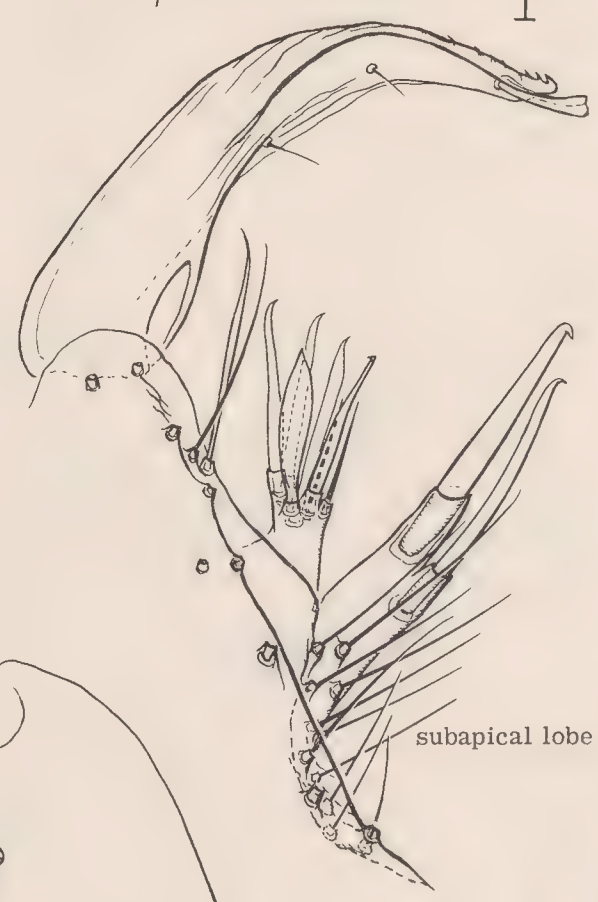
Fig. 24

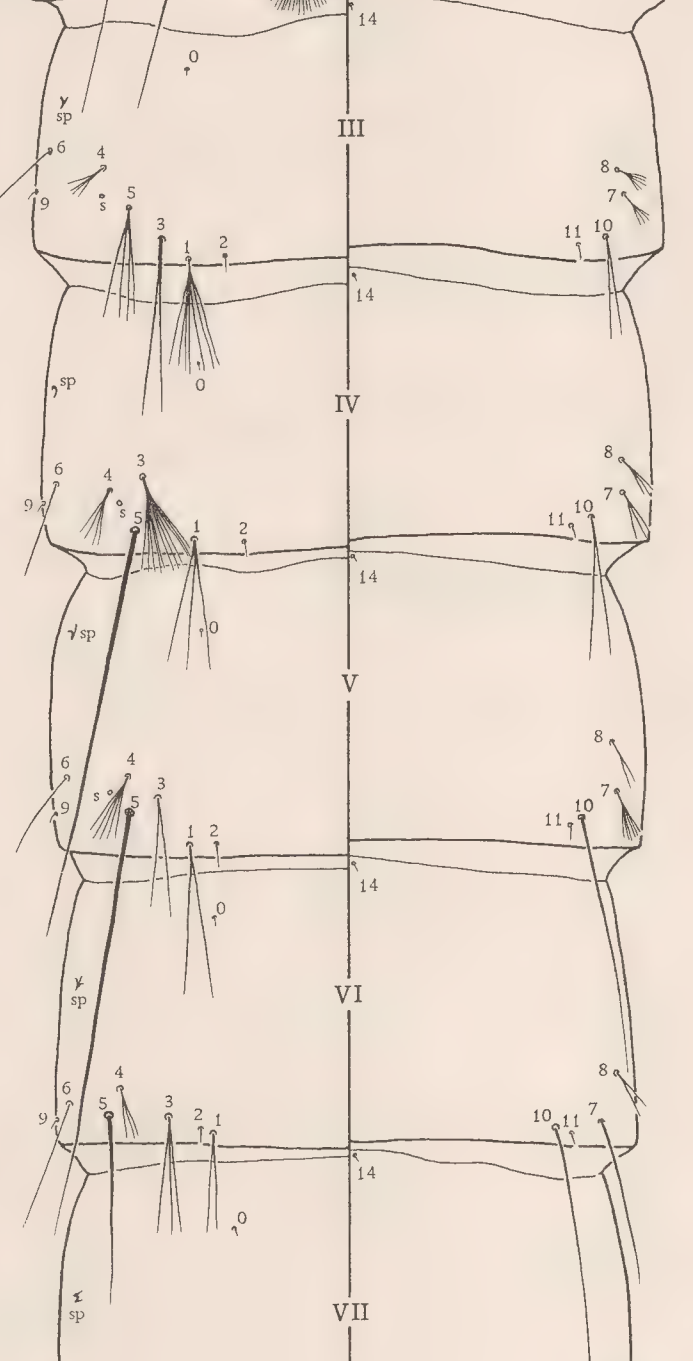
ANOEDIOPORPA

corrigani

PA 438, 442
Pucro
Tacarcuna River Valley
Darien
Panama

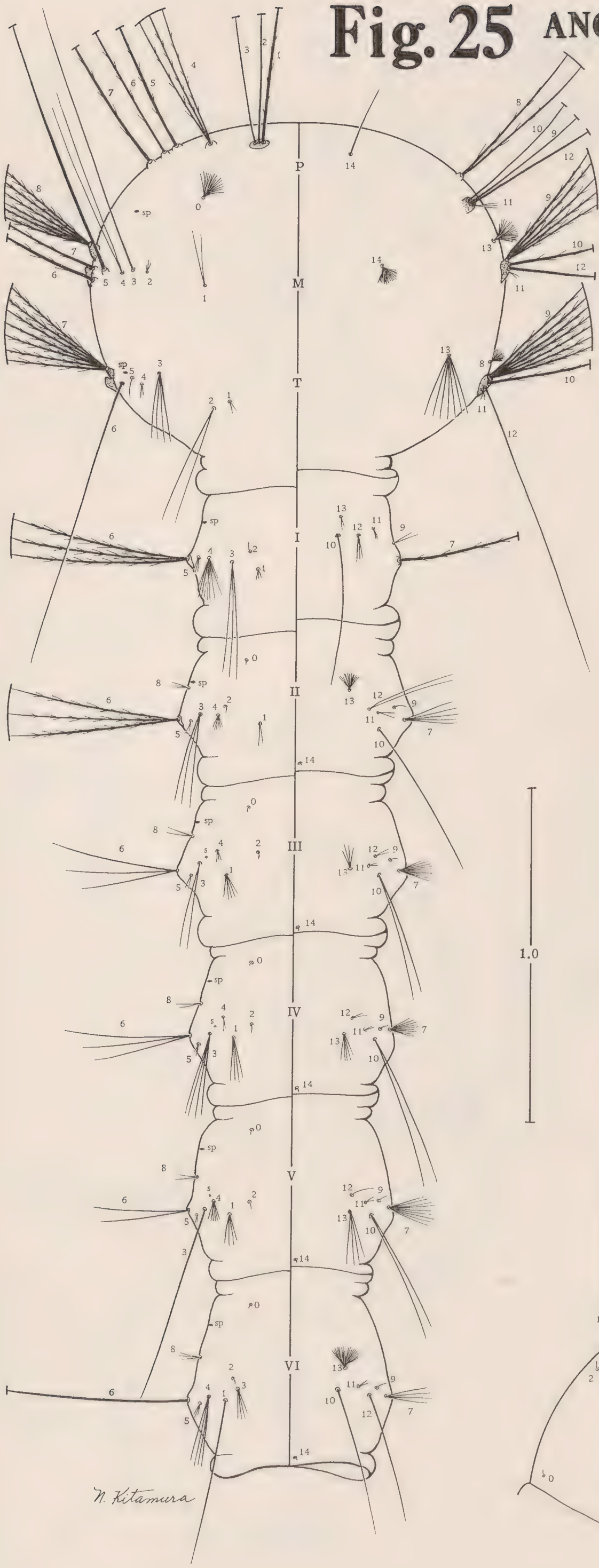


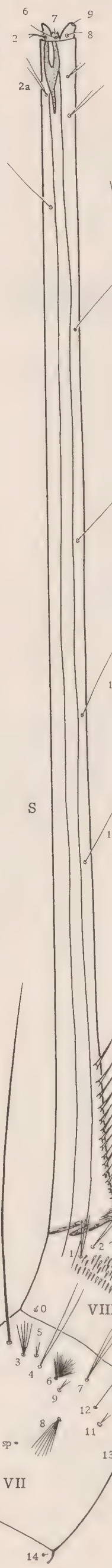


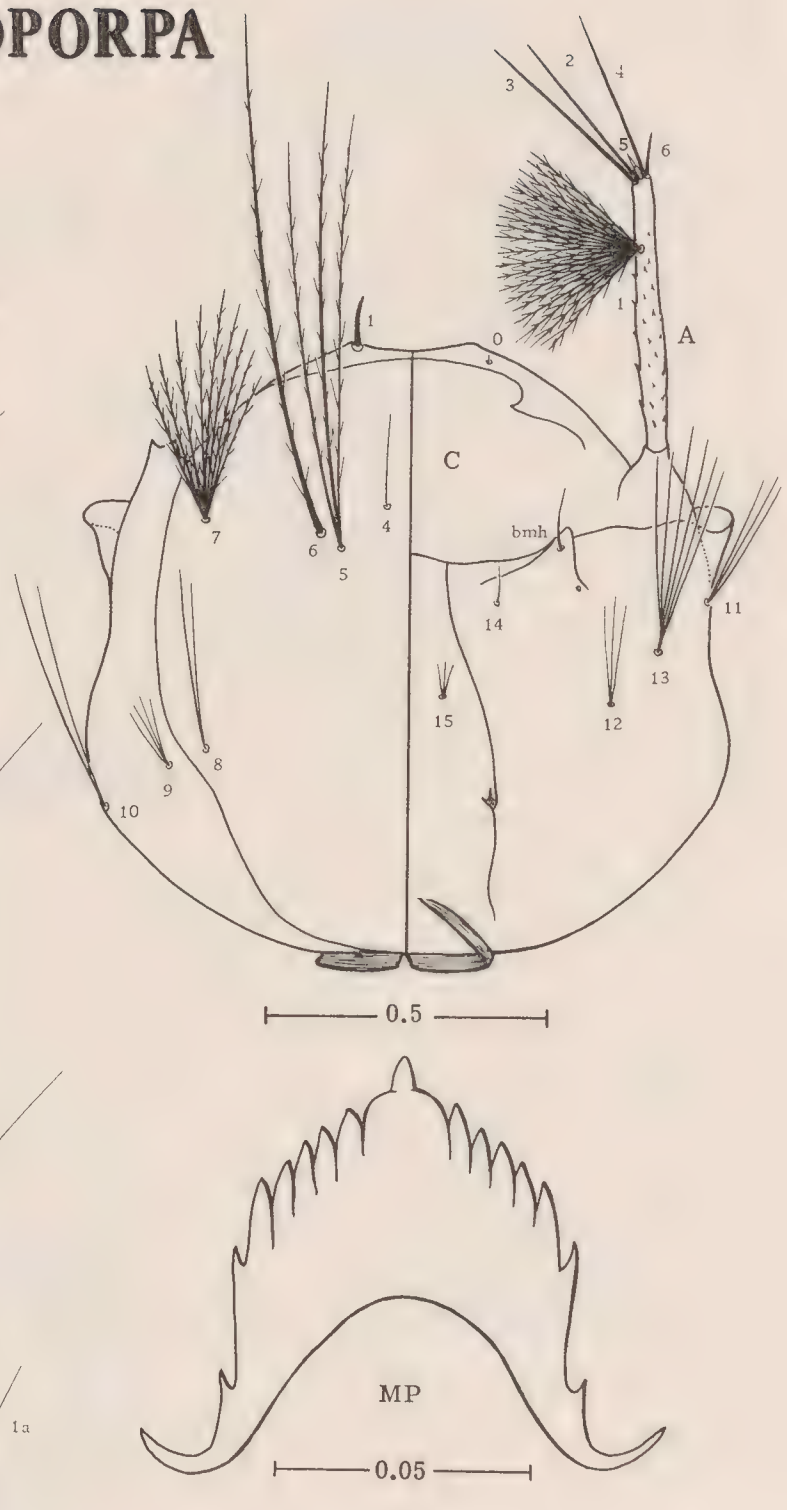


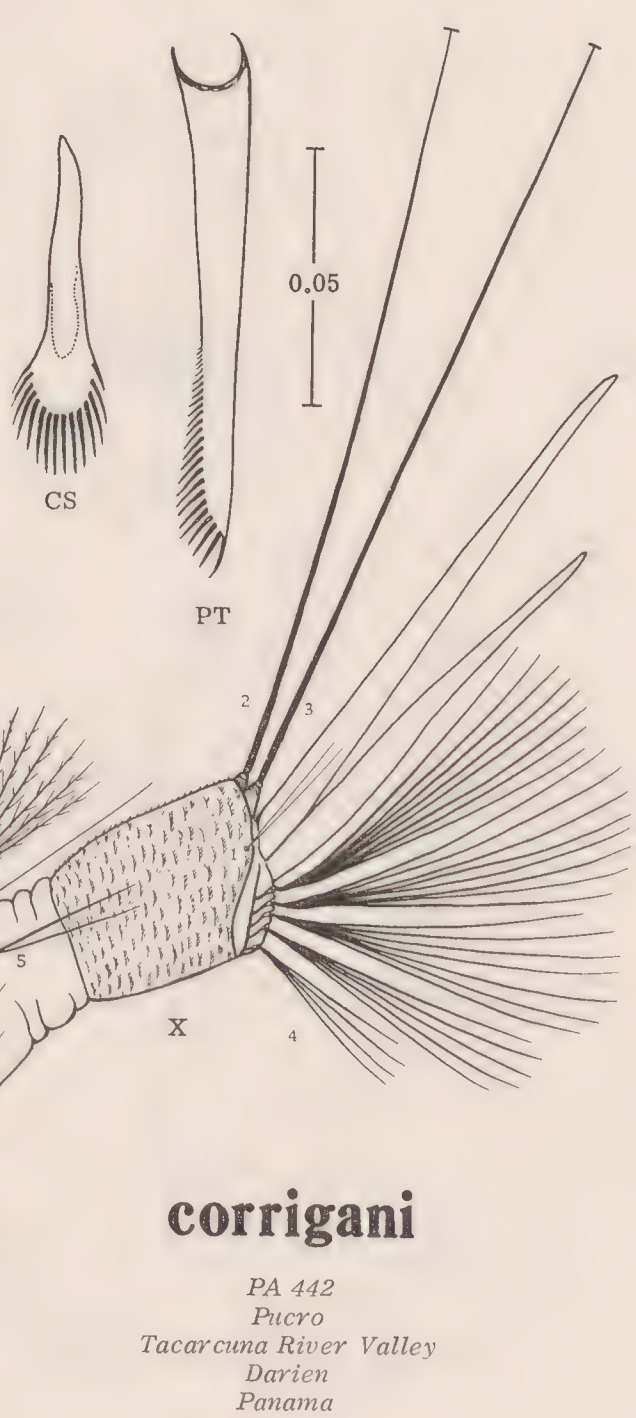
N. Kitamura

Fig. 25 ANOEDIOPORPA







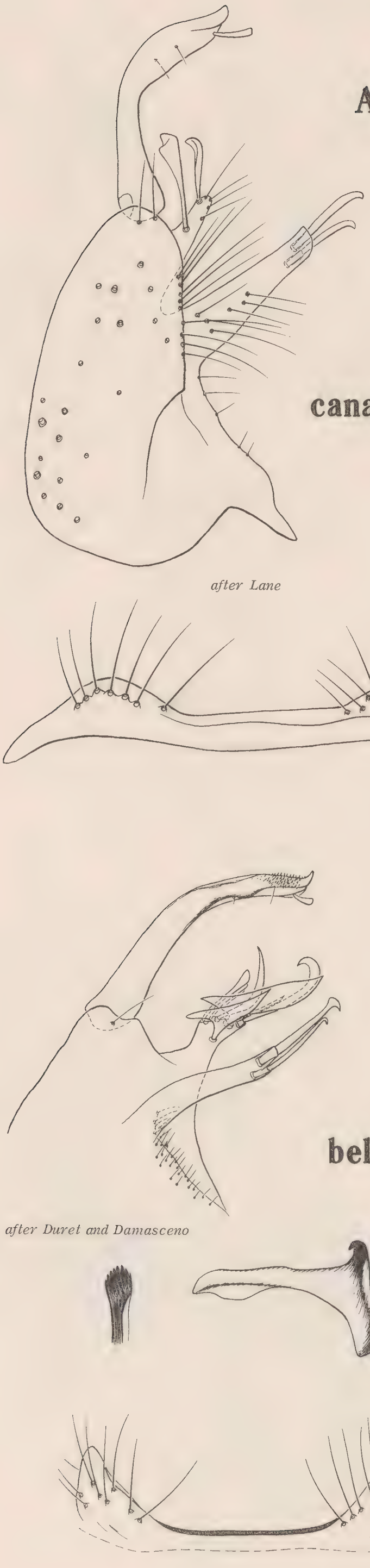


corrigani

PA 442
Pucro
Tacarcuna River Valley
Darien
Panama

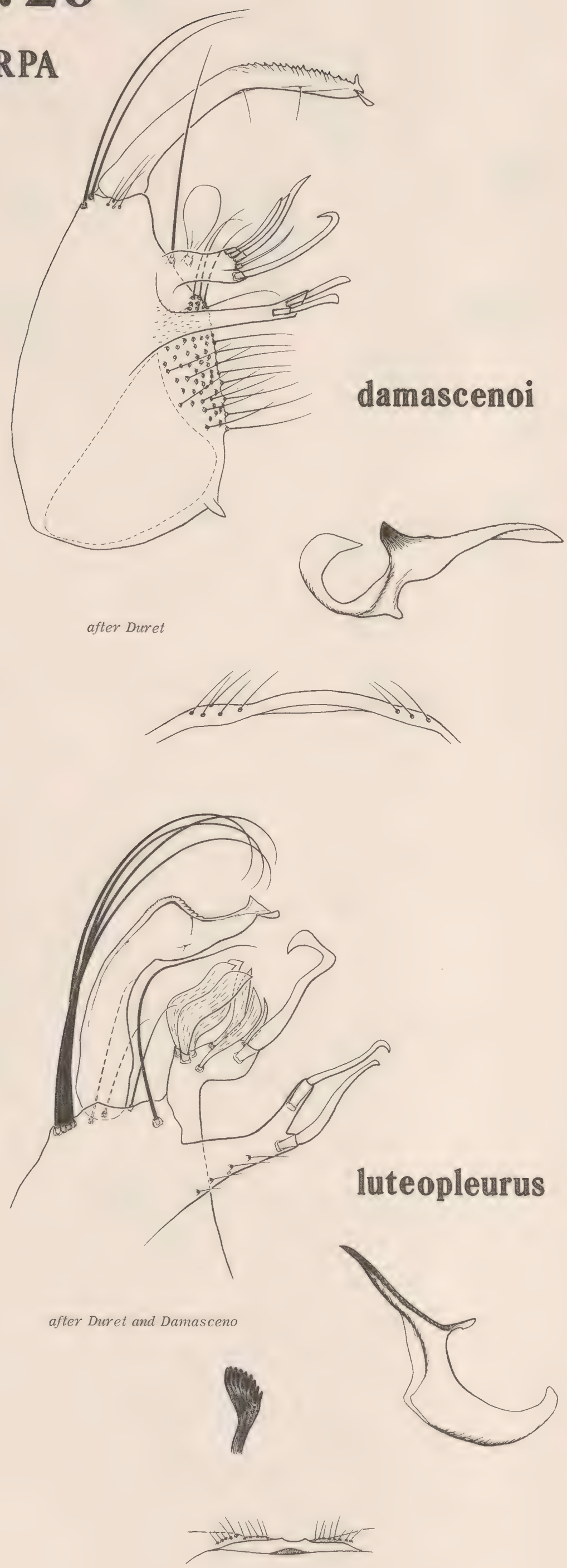
Fig. 26

ANOEDIOPORPA



canaanensis

after Lane



damascenoi

after Duret

belemensis

after Duret and Damasceno

luteopleurus

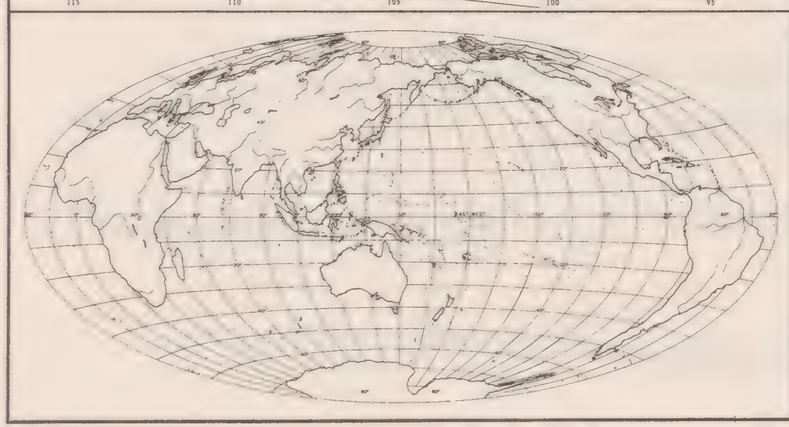
after Duret and Damasceno

Fig. 27

ANOEDIOPORPA

Restrictor Group

•restrictor



MIDDLE AMERICA

KILOMETERS

0 50 100 500 1000 1500

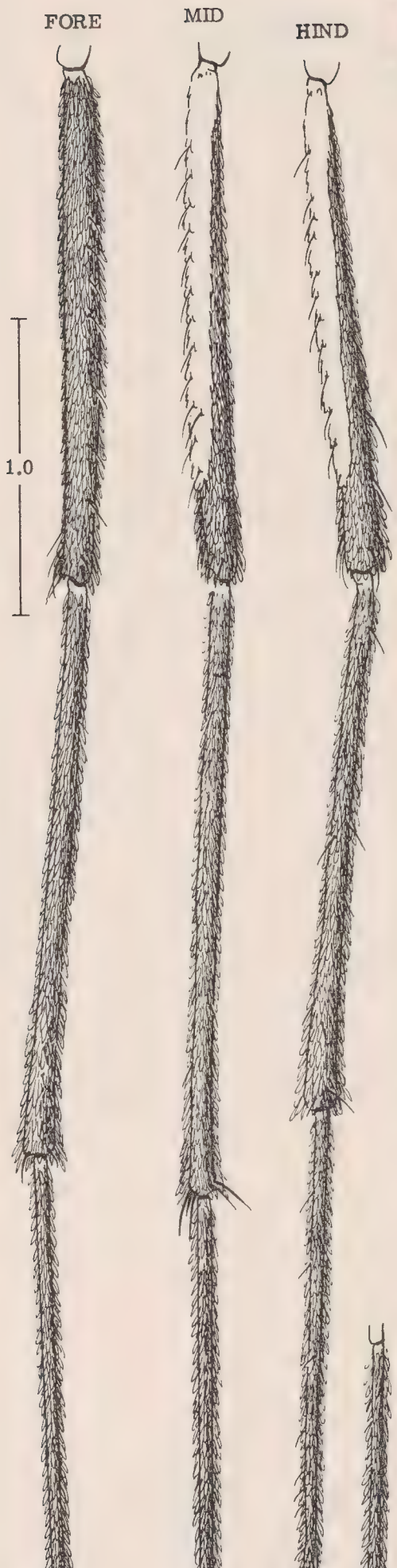
0 50 100 500 1000

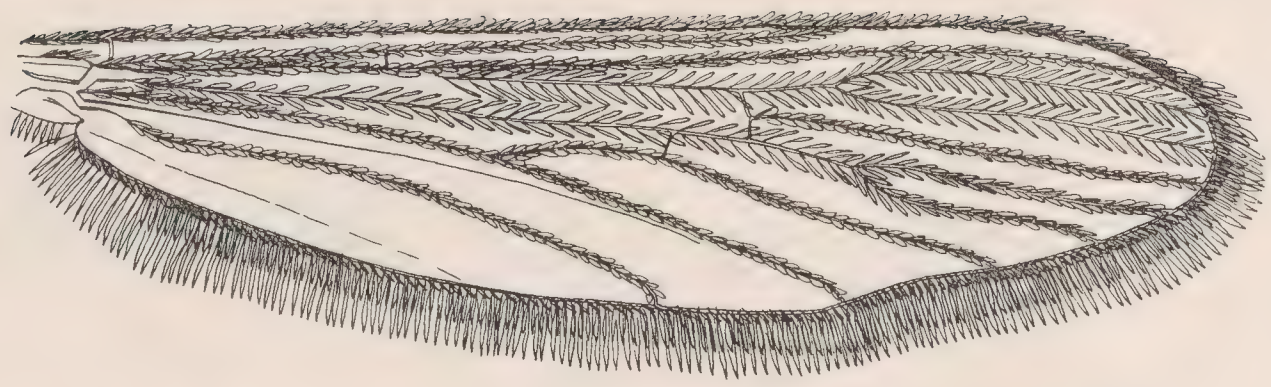
STATUTE MILES

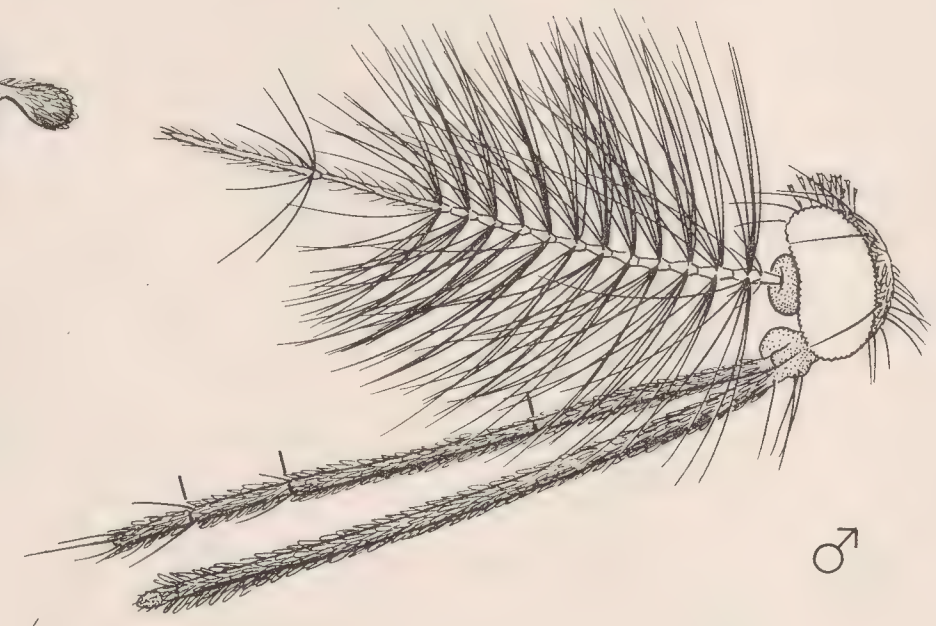
MOSQUITOES OF MIDDLE AMERICA

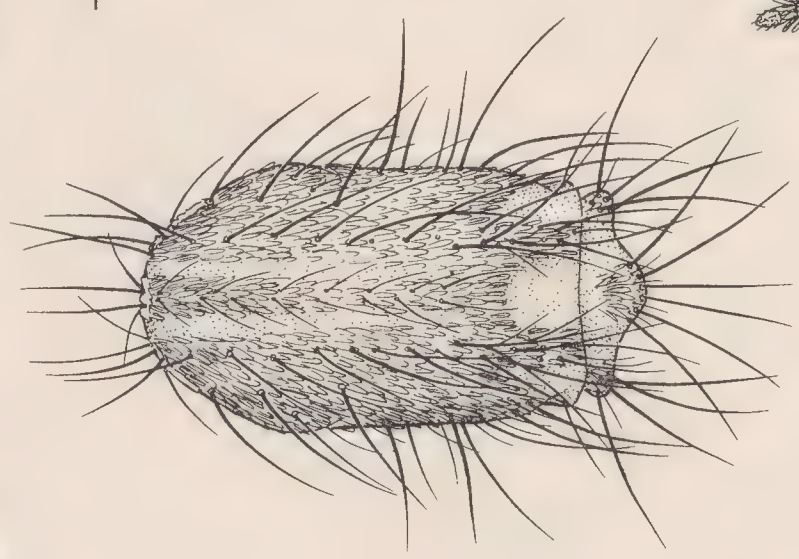
UCLA-ZOOLOGY-ENT-1965-2

Fig. 28









1.0

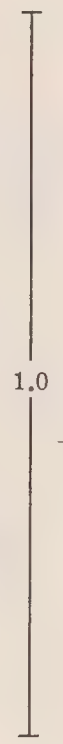
ANOEDIOPORPA

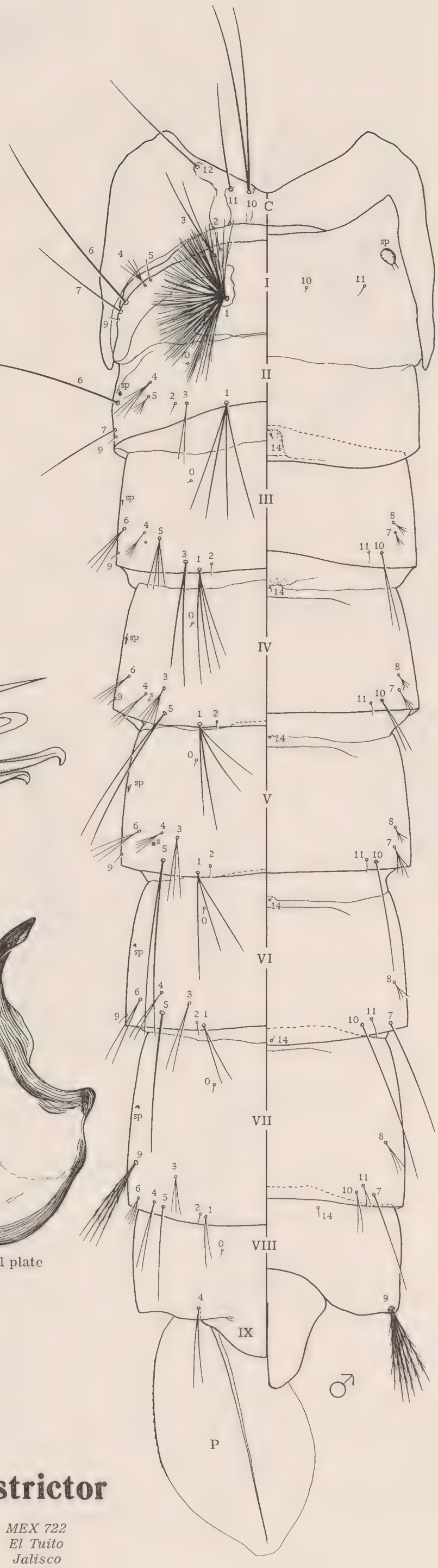
restrictor

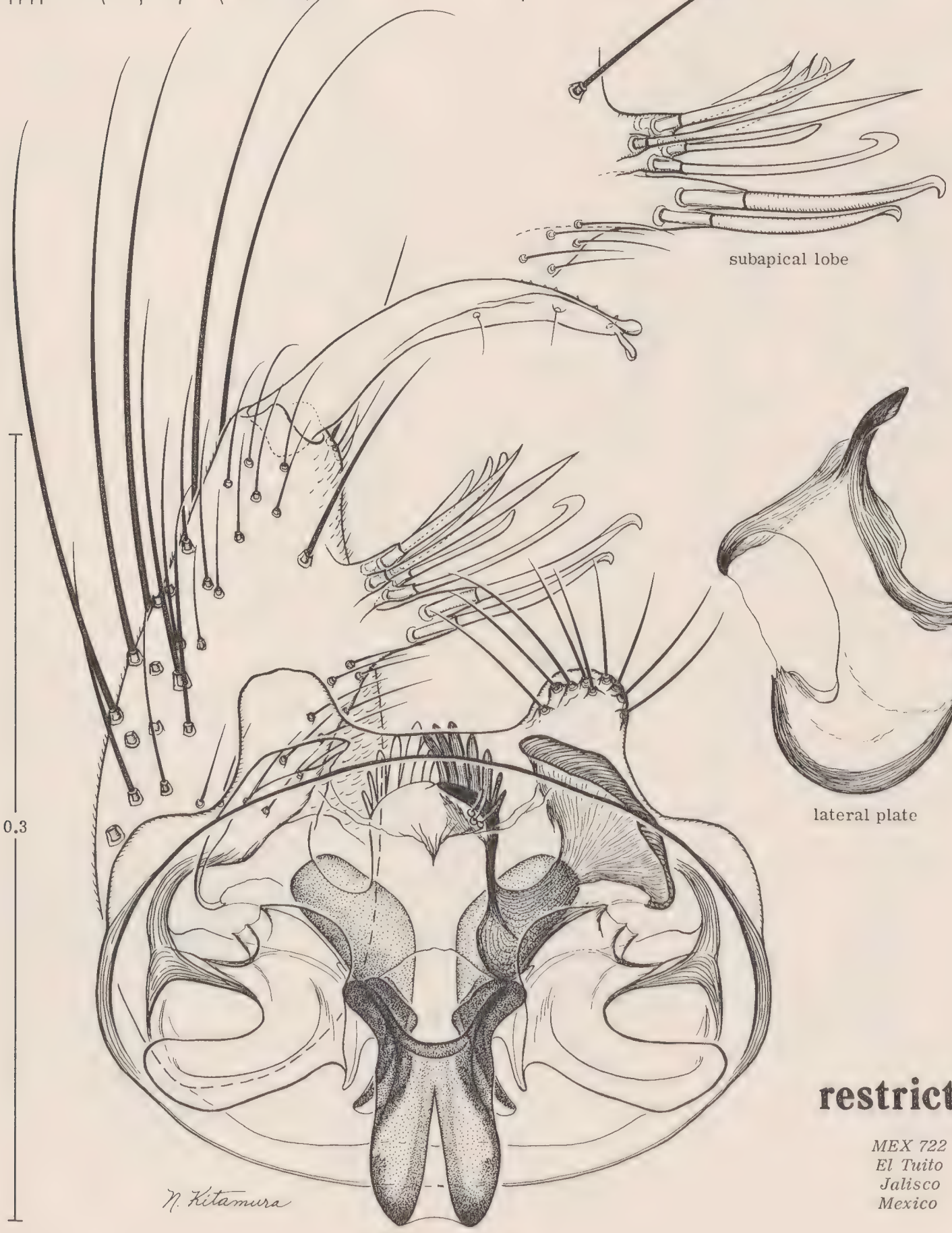
MEX 722
Mexico

Fig. 29

ANOEDIOPORPA







restrictor

MEX 722
El Tuito
Jalisco
Mexico

Fig. 30

ANOEDIOPORPA

restrictor

GUA 44
Rio Bethania
Guatemala City
Guatemala

N. Kitamura

TABLE OF DISTRIBUTIONS

		AEDINUS				TINO-LESTES	ANOEDIOPORPA										
		1. amazonensis	2. clastrieri	3. guyanensis	4. accelerans	1. latisquama	1. conservator	2. canaanensis	3. damascenoi	4. browni	5. bamborum	6. belemensis	7. chaguanco	8. originator	9. quasioriginator	10. luteopleurus	11. corrigani	12. restrictor
MEXICO	Pacific																	●
	Atlantic						●											●
GUATEMALA	Pacific																	●
	Atlantic						●											
BELIZE							●											
EL SALVADOR																		●
HONDURAS	Pacific																	
	Atlantic					●	●											●
NICARAGUA	Pacific																	
	Atlantic					●											●	
COSTA RICA	Pacific						●											●
	Atlantic					●											●	●
PANAMA	West	●				●	●										●	●
	Central	●			●	●	●					●					●	●
	East				●	●	●					●					●	●
COLOMBIA	Pacific					●						●						
	Caribbean	●			●	●						●						
	Orinoco	●					●				●	●						
	Amazon	●																
ECUADOR	Pacific	●																
	Amazon	●										●						
VENEZUELA	Caribbean	●					●											●
	Orinoco												●					
TRINIDAD		●			●		●											
TOBAGO							●											
L. ANTILLES													●					
GUYANA		●			●								●					
SURINAME		●					●											
FR. GUIANA		●	●	●	●		●		●			●		●				
BRAZIL		●	●		●		●	●	●			●		●	●	●		
ARGENTINA													●					

CONSPECTUS OF TAXONOMIC CHANGES

Transfer in Subgeneric Taxon

restrictor Dyar & Knab 1906, with synonym *consternator* Dyar & Knab 1908, from subgenus Microculex to subgenus **Anoedioporpa**. p 30.

New Synonymies

menui Clastrier 1971, to synonymy with **damascenoi** Duret 1969. p 43.

paganus Evans 1923, to synonymy with **conservator** Dyar & Knab 1906. p 37-38.

Transferred Synonymy

surukumensis Anduze 1941, from synonymy with **conservator** Dyar & Knab 1906 to synonymy with **originator** Gordon & Evans 1922. p 52.

INDEX TO SCIENTIFIC NAMES

Invalid taxa are in *italics*; valid taxa treated in detail in present paper are in **boldface**. Major page references are in **boldface**; page reference to keys is shown by suffix "k"; figure numbers are in *italics* at the end of the entry, preceded by abbreviation *figs.*